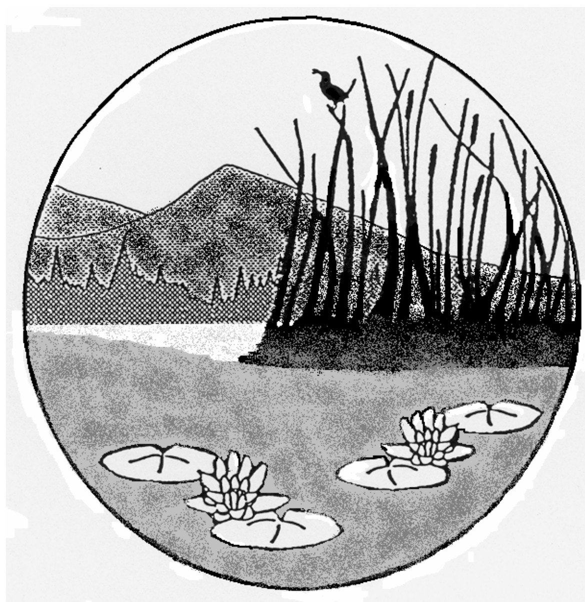
METHOD FOR THE COMPARATIVE EVALUATION OF NONTIDAL WETLANDS IN NEW HAMPSHIRE

Prepared for the Assistance of New Hampshire Towns



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Previously, throughout this publication, reference was made to the Soil Conservation Service (SCS). The name of that agency was changed to the Natural Resources Conservation Service (NRCS) and is referred to as such within this reprint. Efforts have also been made to provide correct and up-to-date information regarding addresses and agency information mentioned in this publication.

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Prepared for the Assistance of New Hampshire Towns by:

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Based on the "Method for the Evaluation of Inland Wetlands in Connecticut"
(Ammann, et al., 1986)

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Robert W. Varney, Commissioner
John Dabuliewicz, Assistant Commissioner

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A Note on This Manual:

The original version of this evaluation method, the "Method of the Evaluation of Inland Wetlands in Connecticut" was published in 1986 by the Connecticut Department of Environmental Protection. The method was extensively reviewed by selected municipal officials, state agencies and academicians, and field tested by a limited number of users prior to publication. The Connecticut Method is in the process of being revised. An advance copy of the revision was made available during the development of the N.H. Method. Some of the material prepared for the New Hampshire Method will be incorporated in the final version of the Connecticut Method.

The Draft Revision (Levere, Ed., August 1990) of the Connecticut Method was adapted for New Hampshire through an Editorial Review Committee comprised of representatives of a number of state and private organizations listed below.

Editorial Review Committee for the New Hampshire Version of the Method for Evaluating Inland Wetlands

Alan Ammann	U.S.D.A. Natural Resources Conservation Service (NRCS), Durham
Phil Auger	UNH Cooperative Extension
Peter Davis	N.H. Association of Conservation Districts
Rick DeMark	North Country Resource Conservation and Development
Ken Kettenring	N.H. DES Wetland Bureau
Marty Michener	New England Institute for Environmental Studies
Frank Mitchell	UNH Cooperative Extension
Dave Mussulman	U.S.D.A. Natural Resources Conservation Service (NRCS), Durham
Sid Pilgrim	Society for Soil Scientists of Northern New England
Nancy Rendall	N.H. Association of Wetland Scientists
Amanda Lindley Stone	Audubon Society of New Hampshire
Marge Swope	N.H. Association of Conservation Commissions

A number of technical changes have been made in the New Hampshire version of the Evaluation Method. The Flood Control Function has been rewritten. The principal author has added a new Function, Urban Quality of Life, and has separated the Sediment Trapping and Nutrient Retention Function into two Functions: Sediment Trapping, and Nutrient Attenuation. In addition, technical changes have been made in the remaining Functions and the explanatory appendices have been expanded. The introduction to the manual has been rewritten for New Hampshire. A pre-publication review draft of the New Hampshire Method was reviewed by selected state agencies, municipal organizations, and private organizations in New Hampshire prior to publication.

Additional copies of this manual may be obtained from:

N.H. Department of Environmental Services
Water Resources Division
Wetlands Bureau
P.O. Box 2008
Concord, NH 03302
Telephone: (603) 271-2147

The New Hampshire Method should be cited as follows:

Ammann, A.P., and A. Lindley Stone, 1991. Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire. Published by the New Hampshire Department of Environmental Services, NHDES-WRD-1991-3.

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Lakes Region Planning Commission
N.H. Association of Conservation Commissions
N.H. Association of Conservation Districts
N.H. Association of Consulting Soil Scientists
N.H. Association of Wetland Scientists
N.H. Department of Environmental Services
- Wetlands Bureau
- Water Management Bureau
- Water Quality Permits & Compliance Bureau

N.H. Department of Transportation
N.H. Fish & Game Department
N.H. Natural Heritage Inventory
North Country Resource Conservation and Development
Office of State Planning
Rockingham Planning Commission
Society of Soil Scientists of Northern New England
Southern N.H. Planning Commission
State Archaeologist
UNH Cooperative Extension
Upper Valley – Lake Sunapee Council
U.S.D.A. Natural Resources Conservation Service (New Hampshire offices)
Vermont-New Hampshire Soil & Water Conservation Society

We would like to extend our sincere thanks to Alan Levere (editor and contributor of the revised 1990 Connecticut Method) of the Connecticut Department of Environmental Protection (DEP) who provided a great deal of assistance to make the transition from Connecticut to New Hampshire as smooth as possible. We would also like to thank the computer personnel at Connecticut DEP who did an outstanding job of transferring text from one computer system to another.

We thank the following people for their input to the New Hampshire Method: George Stevens (NRCS) for valuable time writing the Flood Control Function, Bill Ingham (NH Fish and Game Department) for providing comments on the Finfish Habitat evaluation, Sid Pilgrim (SSSNNE) for providing the High Intensity Survey (HIS) tables and accompanying text, Steve Hundley (NRCS) for compiling hydric soils information by county, Victoria Bunker for providing comments on the Historical Site Potential Function, and Theodore Kelsey (NRCS) for comments on the Urban Quality Life Function.

Many thanks go to Janet Bourne (Audubon Society of New Hampshire) for patiently word processing and proofreading draft after draft of the N.H. Method, and Iain MacLeod (Audubon Society of New Hampshire) for the cover artwork, and for producing many of the graphics in the text.

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Amanda Lindley Stone
Alan P. Ammann
March 1991

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INTRODUCTION

I. INTRODUCTION

Over the past several decades an understanding of the importance of freshwater wetlands to the quality and integrity of the environment has spread from the scientific community to the public at large. This increasing awareness is changing the once popular desire to drain and fill wetlands to that of preserving and managing wetlands for their many natural values. As a result, new laws and regulations have been enacted to protect these valuable resources from the type of wholesale destruction that occurred in the past.

While the overall significance of wetlands is recognized, the functions and values of specific wetland sites often remain undefined. Because development pressure often requires towns to place relative priorities on the future use of these areas, it is essential that the towns have available a practical means of evaluating their wetland resources.

I.1 PURPOSE OF THE NEW HAMPSHIRE METHOD (NH METHOD)

This manual provides a method of wetland evaluation for use by public officials and other who have some familiarity with wetlands, but who are not necessarily wetland specialists. It is intended to be used for planning, education, and wetland inventory purposes and not for detailed impact analysis on individual wetlands.

The NH Method is designed to be scientifically defensible if used for its intended purposes, while being simple enough for use in an inventory/evaluation of all the wetlands in a study area (typically a town or watershed). The NH Method ranks evaluated wetlands on each of 14 recognized Functional Values (listed in Section II. 1). There is no overall score and no built-in rating of high, medium, or low.

The NH Method is based on the concept that, from a town's point of view, the value of a wetland needs to be judged at the local level. In a local context, a given wetland may have a high value for certain functions. However, when compared regionally or nationally to other wetlands of the same type, it might have only marginal value.

I. 2 DEFINITION OF WETLANDS IN NEW HAMPSHIRE

The definition of wetlands in the NH Method includes those areas defined as inland wetlands according to the regulatory definition used by the E.P.A. and the U.S. Army Corps of Engineers for administering the Section 404 permit program. The State of New Hampshire also adheres to this definition:

> [Wetlands are] those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

I.3 WETLAND EVALUATION VERSUS WETLAND DELINEATION

There is frequently confusion over the difference between wetland **evaluation** and wetland **delineation**. Wetland delineation is the process of marking a line on the ground (and ultimately on a map), delineating the boundary between the wetland and upland. For Federal and most state jurisdictional purposes, the delineation must be carried out using the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation, 1989). This delineation is aimed at determining the precise location of the wetland/upland boundary based on field indicators (such as vegetation, soils, and hydrology), and is best accomplished by an experienced wetland scientist.

Wetland evaluation is the process of determining the value of a wetland based on an assessment of the potential and/or actual Functional Values of that wetland. For example, an evaluation may indicate that a wetland is important for sediment trapping. **The NH Method is a method of wetland <u>evaluation</u>, and is independent of the delineation process.**

I.4 RECOMMENDED USES OF THE NEW HAMPSHIRE METHOD

The NH Method is designed to be used as a tool for the following purposes:

1. Educating members of conservation commissions, town boards, and others about wetland functions and values.

2. Collecting basic information about the wetlands in a particular study are which could be a town, a watershed, or a region of the state.

3. Creating a database containing the relative ranking of the evaluated wetlands for a number of Functional Values, as well as other data about the wetlands.

4. Supporting the planning and decision making process within a town or region.

It is very important to keep in mind that the NH Method is an inventory and planning tool, and not a detailed evaluation method. It is intended to be used to compare the relative values of a number of wetlands and not as a site-specific impact evaluation tool.

Situations may arise where more intensive evaluation procedures, such as WET (Adamus et al., 1987), or detailed site-specific studies will be needed. For example, because an inventory/evaluation of a town's wetlands using the NH Method has indicated that a wetland has one of the highest values for wildlife within the town, the town might then require a developer to analyze, in detail, the impacts of a proposed project on the wildlife habitat value of that wetland.

Likewise, a town may want to have further studies conducted on a group of wetlands which rank high for those functions required for Prime Wetland designation. In this case, the NH Method could be used for the initial screening of wetlands and a more detailed method would then be used for the final selection of candidate wetlands. At the present time, at least one New Hampshire town has successfully used the 1986 version of the Connecticut Method to evaluate candidate wetlands for Prime Wetland designation.

The recommended procedure for using the NH Method is to evaluate all the wetlands within a town, or in designated watersheds within a town. The NH Method is designed to be simple enough for town officials or volunteers to carry out the evaluation themselves following training. Most towns, however, may benefit from professional help in conducting this evaluation. Professional assistance might range from oversight/quality control to the professional actually carrying out the evaluation and presenting the results in a form that the town could use in its planning and decision making process (refer to Section I.6 for further details). The information obtained from an evaluation using the NH Method would provide a base of information that the town could use in making rational decisions about the wetlands within the town.

A word of caution is in order. As with any form of land use planning, there is no substitute for critical thinking and nothing more potentially disastrous than an uncritical adherence to a formula or procedure. The results of an inventory/evaluation should be carefully checked to make sure that the results make reasonable sense.

The NH Method uses the size of the wetland as a weighting factor for each of the Functional Values. In most cases this is justified because the known Functional Values of wetlands are generally related to size. Like most generalizations, however, the idea of larger being better does not always hold true. Some small wetlands may have special values, such as the presence of a threatened or endangered species or the fact that they are the last remaining wetlands in otherwise urban areas. Because of this, a Noteworthiness Functional Value was included in the NH Method to help ensure that important wetlands, which might rank low because of size or other factors, are given equal consideration.

An important point to note is that while each wetland is ranked for each Functional Value evaluated, the NH Method does not make any judgment about which value is the most important. That is determined by the political process within the town. For example, one town may consider flood control to be of primary importance while another may be more concerned with wildlife habitat.

Some towns may not wish to evaluate wetlands for values they do not consider important. In those cases the evaluation process can be somewhat simplified by leaving out certain values. However, if one or more Functional Values are left out of the evaluation, it should be done consistently throughout the study area. All wetlands should be evaluated for all the Functional Values chosen by the town, except where a particular value does not apply, such as Urban Quality of Life. One town has done this by incorporating only five of the values in its subdivision regulations. In practice, however, this may not save as much time as expected because the user will still have to collect the basic data and conduct the field visits. The time saved by leaving out certain Functional Values may only be a fraction of the time spent on the evaluation. A further caution with omitting one or more of the Functional Values is that if the evaluation is to be used for Prime Wetland designation, all the values will be necessary.

The following sections provide example of recommended uses of the NH Method. Users should recognize that in some cases they may need additional information which will have to be obtained from more detailed wetland evaluation methods or from site-specific studies.

I.4.1 Wetland Protection

In New Hampshire, with its Yankee tradition of town government, land use decisions are primarily seen as local decisions. These decisions can be improved through the use of the NH Method. The ranking of wetlands for different Functional Values allows a town to tailor wetland protection for those values it views as most important. For example, a town may wish to purchase easements on wetlands which rank high for visual and aesthetic qualities if that Functional Value is particularly important to the town. The following are methods of wetland protection which a town can use to protect its wetlands:

1. **Zoning and Subdivision Regulations** – Wetlands can be protected through zoning ordinances and setback requirements in subdivision regulations.

2. **Comments to the New Hampshire Wetlands Board** – Although wetland permits are issued at the state level, there is a great deal of opportunity for local input into land use decisions which affect wetlands. Municipal conservation commissions have the legal authority to comment on permit applications on behalf of the town. Individuals may also comment on these applications.

3. **Designation of Prime Wetlands** – Under the New Hampshire statute (RSA 482-A) for protecting wetlands from “despoliation and unregulated alteration”, municipalities are able to designate some of their high value wetlands as “Prime Wetlands” (RSA 482-A:15). The advantage to designating Prime Wetlands is that such wetlands are given special consideration by the Wetlands Board in permit application reviews.

4. **Acquisition of wetlands** – Wetlands can be acquired either through the purchase of development rights, gifts, or by securing conservation easements on lands characterized by wetlands.

5. **Comments to the U.S. Army Corps of Engineers** – Virtually all major wetland alterations require a Federal permit in addition to a state permit. The town and individual citizens can comment during the Federal permitting process.

I.4.2 Prioritizing Wetland Values Within a Town

Based on an inventory/evaluation, town official will be in a better position to prioritize those wetland values which are important to the town. For example, towns which are seeking to maintain a rural character may discover that the visual/aesthetic value of their wetlands is very important to this end.

I.4.3 Wetland Management

In addition to protecting wetlands there is the larger natural resources issue of managing wetlands to maintain their Functional Values. For very pristine wetlands, management may require simply keeping town official and the public aware of the importance of the wetland so that land use decisions which might adversely affect the Wetland can be avoided. The information derived from an inventory/evaluation may be useful in targeting certain wetlands for more detailed study and/or management. For example, wetlands which have a lowered visual/aesthetic appeal because of trash and litter might be targeted for a community clean-up.

I.4.4 Education

The N.H. Method is suitable as an educational tool for increasing awareness of the functions and values of wetlands. Potential audiences, in addition to town commissions, may include interested members of the public, high school science students, youth groups, and environmental organizations.

I.5 LIMITATIONS OF THE NEW HAMPSHIRE METHOD

The use of the N.H. Method out of context or beyond its intended purposes could result in misleading information which could lead, in turn, to bad decisions. The N.H. Method has the following limitations which should be considered in its use:

1. The N.H. Method is designed for use by town officials and other as described in Section I.4 These are the **only** recommended uses of the N.H. Method.

2. The N.H. Method is designed to be used for the **comparison** of the Functional Values of a number of wetlands. It is not suitable for evaluating a single wetland, although the basic information collected during an inventory/evaluation of a town's wetlands may be useful to wetland professional undertaking a detailed assessment of individual wetlands.

3. The N.H. Method is **not designed for impact analysis**. Impact analysis requires the judgment of a wetland professional who would be responsible for selecting a detailed method of evaluation and/or conducting detailed on-site studies of wetland functions. However, the information collected during an inventory/evaluation using the N.H. Method may be useful to wetland professionals undertaking an impact analysis of a particular wetland.

4. The NH Method is not intended to be used as a justification for the destruction of wetlands which rank low in value for a particular Functional Value or a group of Functional Values. It is the consensus among wetland professional that all wetlands have some value and that **all losses of wetlands are to be avoided, if possible, and mitigated where avoidance is not possible.**

5. The N.H. Method may appear to give too low a rating to some small wetlands unless careful use is made of the Noteworthiness Functional Value. For example, a small wetland may have only limited function for wildlife habitat but its value for this function might be high because it is the only wetland readily available for bird watching by residents of a nearby retirement home.

6. The N.H. Method is not designed for use in legal proceedings which require detailed information about individual wetlands.

I.6 IMPLEMENTATION OF A WETLAND INVENTORY/EVALUATION

There are several ways in which a town could accomplish a wetland inventory/evaluation using the N.H. Method. As mentioned above, the N.H. Method is designed for use by town official themselves, but in practice, towns can benefit from professional help in evaluating the wetlands in their town. The following are several scenarios illustrating how a town could make use of various degrees of professional help:

1. Town officials receive training in the N.H. Method. With limited professional help from NRCS, Cooperative Extension, public agency personnel, or a private consultant, the town officials undertake the inventory/evaluation themselves.

2. Town officials receive training in the N.H. Method. They collect the necessary background information and prepare the wetland base map and overlays. At this point, the town hires a consultant to do the actual field work. Those town officials then organize the data as described in Appendix H.

3. Town officials receive training in the N.H. Method. They decide to hire a consultant to carry out the entire evaluation including the organization and display of the data.

Many variations of the above scenarios are possible. The point is that the relative simplicity of the N.H. Method allows considerable flexibility in carrying out an inventory/evaluation of the wetlands in a town.

I.7 ORIGIN OF THE NEW HAMPSHIRE METHOD

The procedure described in this document is an adaptation of the "Method for the Evaluation of Inland Wetlands in Connecticut" (Ammann, et al., 1986) which was a product of the Central Coastal River Basin Study conducted by the United States Department of Agriculture Economic Research Service (ERS), Forest Service (FS), and Natural Resources Conservation Service (NRCS), in cooperation with the Connecticut Department of Environmental Protection (DEP). The Connecticut Method was developed in 1984 by an interdisciplinary team of NRCS technical specialists, initiated by Allan Williams who foresaw the need for a multi-function wetland evaluation system for the State of Connecticut. In some cases, ideas and information from other existing methods were used when they were applicable. The review of existing methods was greatly simplified by the work of Lonard, et al. (1981) which described the most promising of more than 40 existing wetland evaluation methods. The original Connecticut Method is currently being revised (Levere, ed., 1990) in a cooperative effort between NRCS and the Connecticut Department of Environmental Protection. The senior author of the N.H. Method is participating in this revision.

We are indebted to the authors of the methods reviewed. In particular, we wish to credit the Federal Highway Administration Method of Wetland Assessment (Adamus and Stockwell, 1983) and WET (Adamus, et al, 1987) as the primary source of information on Nutrient Attenuation, Sediment Trapping, Ground Water Use Potential, and Shoreline Anchoring and Dissipation of Erosive Forces. Golet (1976) provided important material on the Wetland Wildlife Habitat Functional Value. The Method of Smardon and Fabos (1976) was the primary source of information on the Educational Potential and Visual/Aesthetic Functional Values. An evaluation method which had been developed by NRCS for the Massachusetts Water Resources Commission (USDA, 1978) was used as the basis for the overall format and organization of the Connecticut Method.

II. DESCRIPTION OF THE NEW HAMPSHIRE METHOD

II.1 FUNCTIONAL VALUES

In the past, wetlands were considered insect-ridden wastelands whose best use could only be attained through filling and draining for agricultural, industrial, and residential development. It has only been in recent decades that wetlands have been recognized as valuable natural resources that, in their natural state, provide many important benefits to people and their environment. For example, wetlands function to help control floods, enhance water supplies, improve water quality, and provide valuable wildlife habitat.

While many functions of wetlands have been identified as being important to people, few wetlands perform all these functions, and not all functions are performed equally in each wetland. How a wetland will function depends on the specific biological and physical features of each wetland site.

Wetland evaluation is the process of determining the value of a wetland, based on an assessment of the functions that it performs. Most methods of wetland evaluation, including the N.H. Method, deal primarily with such "Functional Values". Functional Values represent the practical, measurable values of wetlands.

The N.H. Method addresses 14 Functional Values of wetlands. This may not represent a complete list of all of the values of a wetland, and it is recognized that additional values of wetlands remain to be discovered. For this reason, the N.H. Method is designed to be open ended. Functional Values (in addition to the 14 included) can be added and can be evaluated using published methods or methods developed by the user for that value. Conversely, some of the 14 values which are not of importance to the user can be dropped. The user is, however, reminded that if the N.H. Method is to be used for Prime Wetland designation, all of the 14 Functional Values are necessary. The Functional Values used in the N.H. Method are listed below:

1. **Ecological Integrity** – Evaluates the overall health and function of the wetland ecosystem.

2. **Wetland Wildlife Habitat** – Evaluates the suitability of the wetland as habitat for those animals typically associated with wetlands and wetland edges. No single species is emphasized.

3. **Finfish Habitat** - Evaluates the suitability of watercourses, ponds, or lakes associated with the wetland for either warm water or cold water fish. No single species or group of species is emphasized.

4. **Educational Potential** – Evaluates the suitability of the wetland as a site for an "outdoor classroom."

5. **Visual/Aesthetic Quality** – Evaluates the visual and aesthetic quality of the wetland.

6. **Water Based Recreation** – Evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing, and other similar recreational activities.

7. **Flood Control Potential** – Evaluates the effectiveness of the wetland in storing floodwaters and reducing downstream flood peaks.

8. **Ground Water Use Potential** – Evaluates the potential use of the underlying aquifer as a drinking water supply.

9. **Sediment Trapping** – Evaluates the potential of the wetland to trap sediment in runoff water from surrounding upland.

10. **Nutrient Attenuation** – Evaluates the potential of the wetland to reduce the impacts of excess nutrients in runoff water on downstream lakes and streams.

11. **Shoreline Anchoring and Dissipation of Erosive Forces** – Evaluates the effectiveness of the wetland in preventing shoreline erosion.

12. **Urban Quality of Life** – Evaluates the potential for the wetland to enhance the quality of urban life by providing wildlife habitat and other natural values in an urban setting.

13. **Historical Site Potential** – Evaluates for indications of use by early settlers.

14. **Noteworthiness** – Evaluates the wetland for certain special values such as critical habitat for endangered species, etc.

The instructions required for evaluating each of the Functional Values in the N.H. Method are provided in Section V. Each of the Functional Values is prefaced by a short introduction describing the significance of that particular Functional Value for wetlands. This introduction is followed by a series of questions that examine the different factors that contribute to that Functional Value. The answers to each of the questions are recorded on data sheets provided for each Functional Value evaluation.

II.2 COMPLETING THE DATA SHEETS

In the N.H. Method, the evaluation of the 14 Functional Values is carried out by completing a series of data sheets (contained in Appendix B). Each data sheet is comprised of four columns:

Column A – Evaluation Questions. This column contains the questions to be answered to assess a particular function. These questions are categorized according to whether they are best answered in the field or in the office. Keep in mind that these categories are flexible and need not be rigidly adhered to. For example, some office based questions may require some field verification as well, and vice versa.

Column B – Computation of Actual Value. This column is blank, and can be used for recording mathematical computations, writing explanatory notes that may be useful for reference at a later date, etc.

Column C – Evaluation Criteria. The third column contains multiple choice answers to each question. In answering any particular question given in Column A, the evaluator will need to decide which of the corresponding criteria given in Column C provide the most appropriate answer to that question.

Column D – Functional Value Index (FVI). Each criterion in Column C is assigned an FVI which rates the criteria for that particular question. The FVI's in Column D are then totaled and averaged to produce an average FVI for each Functional Value.

After completing the evaluation for each Functional Value, the average FVI units for that Functional Value are multiplied by the area of the site being evaluated (the area can comprise the entire wetland, or just part of it). This yields the Wetland Value Units (WVU's) for that Functional Value (discussed in Section II.2.1).

Appendix G provides 2 worked examples of how to complete the data sheets.

II.2.1 Calculating Wetland Value Units

The Wetland Value Units (WVU's) for a wetland are calculated on a set of data sheets (Appendix B) using average Functional Value Indices (FVI) derived for each Functional Value:

(Average FVI) x (A) = WVU

where: Average FVI = Average Functional Value Index (Average of Column D)
A = The acreage of the evaluation area
WVU = Wetland Value Units

The concepts of Functional Value Indices and Wetland Value Units are analogous to those of habitat suitability indices and habitat units used in the Habitat Evaluation Procedure (HEP) of the U.S. Fish & Wildlife Service (1980), and are explained in the further detail below.

FUNCTIONAL VALUE INDICES
The average Functional Value Indices (FVI's) rate the evaluation criteria for a particular Functional Value. The FVI's given on the accompanying evaluation data sheets occur on a scale with increments of 1.0, 0.5, 0.1 (or 0.0 in those questions where the answer is yes or no). However, if it is felt that a particular question falls between two answer categories, inferences can be made as follows:

If the answer to a particular question is neither a) nor b) but falls between the two, use a value of 0.75 (for an example of this refer to Functional Value 2, Appendix G.1). On the other hand, if an answer falls between b) and c), use the value of 0.25. The scale of FVIs that should be adhered to is:

1.0 0.75 0.5 0.25 0.1 (0.0)

EVALUATION AREA

The evaluation area referred to in the above formula will in most cases be the total area of the wetland. Exceptions to this would include the area selected as a potential educational site and the area evaluated for visual and aesthetic quality. In many cases these areas will be less than the total area of the wetland. For example, only 10 acres of a 30-acre wetland may be visible from a road which has been chosen as the viewing point for judging visual quality. In this case the evaluation area will be 10 acres. If several viewpoints are used, an average FVI can be calculated and multiplied by the total area viewed. Similarly, an educational site may only be 5 acres in size but may be part of a 20-acre wetland. In this case the evaluation area for Educational Potential will be 5 acres.

WETLAND VALUE UNITS

The Wetland Value Units (WVU's) are calculated for each Functional Value once the data sheets have been completed. The WVU's for each Functional Value are recorded on the summary data sheet (See Appendices B & G). **Note that the WVU's for the 14 Functional Values of a wetland are not additive**. That is, the N.H. Method does not calculate an overall score for a wetland. The wetlands in a study area should be ranked for each of the Functional Values individually. For example, rank all of the wetlands in the study area for Flood Control Potential to determine which wetlands rank high for this value. The same ranking process would be carried out for each of the remaining Functional Values. Appendix H provides suggested ways of displaying and interpreting the Wetland Value Units for a number of wetlands.

The N.H. Method is designed to measure the relative value of all wetlands in a town or selected watersheds within the town. Consequently, there is no built-in rating scale from high to low, or good to bad. It is generally accepted that all wetlands possess some value and that the value of a particular wetland can be assessed in relation to other wetlands in a given area. A small partially disturbed wetland may have predominantly low WVU's but if it is the only remaining wetland in a developing area, its true value may be higher than if it is in an area of many large undisturbed wetlands. Wetlands of this type can be flagged under the Noteworthiness Functional Value.

II.2.2 Sources of Information

An essential part of the evaluation procedure is the preparation of a wetland base map and overlays of the wetlands to be evaluated (see Section IV). The information recorded on the map and overlays is used for completing the evaluation data sheets.

The information necessary to complete the base map and evaluation data sheets can be readily obtained from such sources as field examination, local inquiry, and by reference to town records, NRCS soils maps, U.S. Geological Survey (USGS) topographic maps, New Hampshire Department of Environmental Services (DES) resource maps, and aerial photographs. (Refer to Appendix A for a list of suggested information sources). Many of the questions can, and should, be answered in the field at the time the wetland map is being prepared. Detailed instructions for completing the data sheets are given in Section V.

Some questions require a degree of judgment by the user. In these cases, criteria are provided on which to base the judgment. The authors recognize the potential problems of introducing subjectivity into any evaluation method. We feel that is unavoidable for several reasons. First and foremost is the necessity of keeping the N.H. Method simple enough to be of practical use by those for whom it is intended. Second, most of the towns which will use the N.H. Method simply do not have the financial resources or technical expertise to use the more sophisticated, data, intensive methods of wetland evaluation on a routine basis.

The recommended procedure for using the N.H. Method is to evaluate all wetlands in a town or selected watershed(s) within a town. All of the wetlands evaluated would then be ranked for each of the 14 Functional Values. The ranking could be speeded up by entering the WVU's of the wetlands into a computerized database management system. With the availability of database systems for desktop computers, such computerization of wetland information is possible at a modest cost. In some cases it may be that suitable database software has already been purchased by a town for another purpose.

III. STEPS IN THE USE OF THE N.H. METHOD

The N.H. Method is designed for use in creating a database of wetland information to be used in policy formulation and decision making. Listed below are some suggested steps for the use of the N.H. Method. Some of the steps can be done concurrently.

1

Determine the Study Area

Establish the study area on a topographic map. This can be a town, a watershed, or a regional area.

2

Assemble the Available Information

This can include soil surveys, surficial geology maps, topographic maps, ground water availability maps, zoning maps and other local town data. Refer to Appendix A for a complete list of suggested source material, as well as the location where each can be obtained.

3

Prepare the Wetland Base Map and Overlays

Section IV provides guidance on determining wetland boundaries and suggested means for preparing the overlays.

4

Determine Watershed Boundary of Wetland(s) Being Evaluated

Appendix F provides guidance to delineating watershed boundaries using topographic maps. This will help you visualize the watershed of the wetlands being evaluated.

5

Collect Field Data

Fill in those portions of the data sheets that should be completed in the field for all wetlands in the study area. Prepare those portions of the overlays that require field information. You will see which portion of each Function is designed to be evaluated in the field.

6

Complete the Data Sheets in the Office

Complete the data sheets and calculate the average FVI's for each Functional Value for each wetland.

7

Fill Out the Summary Sheets for Each Wetland

Calculate the Wetland Value Units (WVU's) for each Functional Value.

8

Rank the Wetlands for Each of the Functional Values *Except* Noteworthiness

Ranking must be done for all the wetlands evaluated in the study area. All the wetlands should therefore be evaluated prior to ranking.

9

Give the Highest Ranking Wetlands in Each Functional Value a "1" for Noteworthiness

Then rank all of the wetlands for Noteworthiness.

10

The wetland information database is now ready for use in wetland policy formulation and analysis, outdoor classroom siting, and similar decision-making functions. See Appendix H for suggested ways to interpret the results..

IV. PREPARATION OF THE WETLAND BASE MAP AND OVERLAYS

An essential part of the inventory/evaluation procedure is the preparation of a wetland base map and overlays for each wetland to be evaluated (see examples in Appendix G). The overlays can be done either on transparencies or on separate sheets (as per the examples in Appendix G). The information recorded on the map and overlays is referred to frequently when answering the questions on the evaluation data sheets. The map can be prepared at any convenient scale; however, for consistency it is suggested that you make use of the same scale map that the municipality uses in record keeping. If you are mapping a wetland for Prime Wetland Designation under RSA 482-A:15, you will need to adhere to the same scale as the town tax maps.

The wetland base map and each of the overlays should contain the following information:

1. **Title Block** – Include 1) the wetland name and/or identification code, and 2) the town and county in which the wetland is located. The investigator may use any convenient system of wetland identification. Wetlands may be named for an associated stream or lake. Several wetlands on the same stream might be consecutively numbered such as Oyster River1, Oyster River 2, etc. Alternatively, wetlands could be named for nearby roads or landmarks. Whatever system is used, it is important that the location of the wetlands is well documented so that each wetland studied can subsequently be easily located. In addition, it would be helpful to prepare a map of the entire area being studied (e.g. watershed, or town), showing the location of all wetlands included in the study (referenced by wetland name or number).
2. **North arrow** (True North)
3. **Legend** (Key)
4. **Scale**
5. **Date of field check**
6. **Source(s) of information** (e.g. NRCS maps, town zoning map, etc.)
7. **Name of person(s) responsible for preparing the map**

IV.1 WETLAND BASE MAP

The wetland base map should indicate the wetland boundary and physical features associated with the wetland as listed below (refer also to Figures G-1 and G-4 in Appendix G):

1. **Wetland boundary** – The location of the wetland boundary will affect a wetland's score when evaluated by any ranking system. The simplest procedure is to trace the wetland soil (hydric soil) delineation from the appropriate NRCS Soil Survey map, and compare it with the wetland boundary of the National Wetlands Inventory (NWI) map (published by the USF&WS) and aerial photos. Some field verification may be necessary to determine more accurate boundaries where needed. If tax maps are being used, you will need to transfer the information from the soils and NWI maps (which will be at different scales) to the tax map scale.

   Since the width of a line on a map can represent from 20 to 40 feet on the ground, the base map may not be totally accurate on a site by site basis. In addition, the smallest soil area mapped on NRCS maps may vary from 2 to 6 acres between counties, and on NWI maps is about 1 acre. (**Note:** Some forested and agricultural wetlands do not appear on the NWI maps due to mapping difficulties associated with these wetlands.)

   The guidelines presented below will assist you in deciding where to locate the boundary of the wetland, particularly in instances where a wetland is bisected by a road or railroad, or where it becomes very narrow along a watercourse. The consistency provided by this guidance will make decisions less arbitrary, and hence, more defendable.

   a. Where a wetland narrows to less than 15m (50 ft.), a boundary should be drawn, dividing the segments into two evaluation units, unless the entire wetland area is this narrow.

b. Wetland bisected by a railroad or 2-lane road is considered to be a single evaluation unit if:

i. Culverts permit the free flow of surface water, and

ii. The slope and drainage of the wetland are unidirectional.

c. Wetland bisected by a railroad or 2-lane road is considered to be two separate evaluation units if either:

i. There is no culvert, or the culvert is blocked, or

ii. The slope and drainage of the wetland run in more than one direction away from the road.

d. Wetland cut by a 4-lane (or greater) highway is considered to be two separate evaluation units.

e. If a wetland crosses the boundary of the study area (town, watershed, etc.) the entire wetland should be mapped and evaluated.

f. If there is a wetland on opposite sides of a large river, both sides and the river water between are considered to be part of the same evaluation unit.

g. If there is a wetland on only one side of a large river, river water adjacent to the wetland is included in the evaluation.

h. Wetlands located along large river channels (>50 feet) terminates wherever upland borders the channel directly on both sides.

2. **Major roads** – Where possible, trace roads from 7.5 minute USGS topographic maps, or on-site investigation.

3. **Railroads, power lines, pipe lines, utility rights of way, etc.**

4. **Watercourses** (including lakes and ponds)

5. **Location of potential educational site** (Functional Value 4).

6. **Location of viewing area** (Functional Value 5).

NOTE: The information for items 2-4 should be obtained from the USGS topographic quadrangles unless a more current source is available.

IV.2 OVERLAY 1 – WETLAND SOILS AND LAND USE ZONING

Overlay 1 should contain the following information:

1. **Wetland boundary** (Already available from the base map).

2. **Wetland soils** – Trace individual soil type boundaries (hydric soils) from the NRCS county soils survey map and label each soil type. Include upland soil inclusions up to a maximum size of 3 acres. Upland inclusions larger than 3 acres should not be included as part of the wetland.

3. **Land use zoning** – Land use zoning may be obtained from the Town Zoning Map. (Where a town does not have zoning, use the municipal tax maps to obtain land use information).

IV.3 OVERLAY 2–WETLAND TYPES AND LAND USE IN 500 FOOT BUFFER ZONE

Overlay 2 should contain the following information:

1. **Wetland boundary** (already available from the base map).

2. **Wetland classes** – These may be mapped in the field, or derived from aerial photographs or NWI maps. The preferred classification is that prepared by Cowardin et al. (1979) because it is the most complete. It was used in the National Wetland Inventory maps and can lend consistency to your evaluations. Refer to Appendix C for a brief explanation of the Cowardin classification system.

3. **Areas of fill, drainage, and/or altered vegetation** – Indicate all areas which can reasonably be judged to have been filled. Areas of recent fill may be obvious, but older fill areas may be difficult to detect. Look for unnatural or abrupt changes in elevation, especially between developed areas such as lawns or parking lots and surrounding undeveloped areas. Also indicate areas where the wetland plant community has been altered by mowing, grazing, or plowing.

4. **Land use within 500 feet of wetland boundary** – Indicate the 500 foot buffer zone around the wetland. Indicate the different land use types in the buffer zone. Land use categories which can be used include cropland, pasture land, mowed fields, idle land (weedy unmowed areas), brushland (areas dominated by shrubs and young trees), upland forest and urban land.

5. **Occupied buildings within 500 feet of wetland boundary** – Indicate all buildings which are regularly occupied at least a portion of each year. For single family dwellings count garage and house as one building. Count closely grouped buildings in a farmstead or commercial complex as one building.

IV.4 ALTERNATIVES TO OVERLAYS

While the overlays take time to make they are an important part of the evaluation technique. However, some alternatives to the overlays have been suggested as follows:

1. **Use of Existing Information** – The wetlands base map is always essential. However, the other information is still necessary and has to be obtained for reference. The difference is that while the information is at hand, it is not transferred to the same scale as the base map and not made into an overlay format. If you use this method, be careful to scale/measure the necessary information accurately for the correct interpretation.

2. **Wetland Mapping Procedures Utilizing a Geographic Information System (GIS) Format** – Some users will be able to make use of the GRANIT Geographic Information System (GIS) to prepare the base map and overlays. The GIS involves a map overlay system where the wetlands, and all the wetland attributes, can be stored as a database and computer generated in map form. For this application, the road, hydrology, soils, and drainage basin map data layers are necessary. The delineation and the mapping of wetlands needs to be done on a base which can be transferred (digitized) into a GIS. It can then be printed as a map which also depicts roads, hydrologic, and drainage features. This map can easily be overlaid with soils and other natural resources information. Using a GIS ensures that all maps generated share a common base and each can portray any number of data sets suited to the user's need. Further information on the GRANIT GIS system can be obtained from your Regional Planning Commission or the Office of State Planning.

V. INSTRUCTIONS FOR COMPLETING THE DATA SHEETS FOR THE N.H. METHOD

V.1 FUNCTIONAL VALUE 1 – ECOLOGICAL INTEGRITY

Most wetlands in New Hampshire originated during the recession of the most recent continental glacier, 10 to 15 thousand years ago. Since that period, ecosystems have developed slowly in response to changes in climate and soil, from tundra to the complex plant and animal communities which exist today.

The importance of wetlands to the overall health and function of the ecosystem has been the subject of much recent scientific investigation. While many questions need to be answered, it is clear that, in general, wetlands are among the most highly productive ecosystems in the world. This high productivity is due, in part, to their position in the hydrologic cycle. Runoff water, reaching wetlands from surrounding uplands is often high in dissolved nutrients. These nutrients cycle within the wetlands for various periods and produce the lush vegetation characteristic of this community. This productivity is reflected in a diverse animal community. Wetlands, especially pristine wetlands, act as storehouses for plant and animal diversity and provide habitat for a variety of animals, some of which are uniquely adapted to wetlands and depend on wetlands for survival. All these factors contribute to the ecological integrity of the wetland.

Wetlands which have a high level of ecological integrity can serve as potential sites for the study of natural ecosystems. It is necessary to study and understand intact natural systems before we can begin to understand the profound impacts humans have had on the biosphere.

The following questions address a number of factors that enhance the ecological integrity of wetland ecosystems:

QUESTIONS TO ANSWER IN THE OFFICE:

V.1.1 QUESTION 1 – *Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.*

Directions – Establish the size of the wetland using either the dot grid method or a planimeter (see Appendix E.2). Using the same method, measure the size of the area of very poorly drained soils from overlay 1. See Appendix D.1 for the drainage classes of wetland soils in New Hampshire. Express as a percent of total wetland area using the following formula:

$$\frac{\text{Area of Very Poorly Drained Soils or Hydric A Soils (acres)}}{\text{Area of Wetland (acres)}} \times 100$$

Rationale – Very poorly drained soils are the wettest of all soils and are key features of wetlands. These soils remain wet for long periods and are characterized by poor internal drainage. Generally, these soils have severe limitations for many uses, and are the most likely to remain as wetlands in the face of pressure to change land use. This does not, however, diminish the value of poorly drained and somewhat poorly drained soils in wetland systems.

V.1.2 QUESTION 2 – *Dominant land use zoning of wetland (see town zoning map).*

Directions – Determine dominant land use zoning from overlay 1. The dominant land use zoning in this case refers to the zoning class which covers the largest area of the wetland. Note that there may be overlay zones that may affect land use. Use the actual (current) land use if this is different from the land use zoning map.

Rationale – The N.H. Method assumes that wetlands in areas zoned for low intensity use, such as agriculture or low density residential, are least likely to have undergone past disturbance. In addition, wetlands in areas with this type of zoning are the most likely to remain undisturbed in the future.

QUESTIONS TO ANSWER IN THE FIELD:

V.1.3 QUESTION 3 – *Water quality of the watercourse, pond or lake associated with the wetland.*

Directions – Refer to the most recent New Hampshire Water Quality Report to Congress 305(b) which summarizes the current status of both ground and surface water quality throughout the state. If you have difficulty obtaining this information, contact N.H. DES Biology Bureau for data pertaining to lakes, or to the Water Quality Permit and Compliance Bureau for information on rivers. Make a note of any site conditions that may be negatively impacting the water quality for the

Functional Value: e.g. surrounding land use, water color, turbidity, odor, etc. (**Note:** Many inland wetlands, particularly bogs, produce humic acids which stain the water brown. This is not necessarily a sign of poor water quality.)

Rationale – Poor water quality can be harmful to many species of aquatic and terrestrial life. Indeed the whole character of the wetland ecosystem can change when it is exposed to excess nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies which can, in turn, cause a change in the species composition of both the plant and animal communities.

V.1.4 QUESTION 4 – *Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres)*

Directions - Count the number of occupied buildings recorded on overlay 2. Use the wetland area determined in question V.1.1.

$$\frac{\text{Number of occupied buildings}}{\text{Area of Wetland (acres)}}$$

Rationale – Occupied buildings are a focus of human activity. This activity can be detrimental to many species of plants and animals. Colonial nesting birds, such as herons and egrets, are particularly vulnerable.

V.1.5 QUESTION 5 – *Percent of original wetland filled.*

Directions - Measure the area of filled wetland recorded on overlay 2. Areas of recent fill may be obvious, but older area of fill may be more difficult to detect. Look for unnatural or abrupt changes in elevation, especially between developed areas, such as lawns or parking lots, and surrounding undeveloped areas. Express the area of fill as a percentage of the total wetland area before fill. (Use the wetland area determined in Question V.1.1).

$$\frac{\text{Area of fill}}{\text{Total Area of Wetland (acres)}} \times 100$$

Rationale – Fill can disrupt wetland functions by changing the hydrology of the wetland as well as through the direct destruction of the plant community. Sanitary landfills may also be a source of water pollution.

V.1.6 QUESTION 6 – *Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.*

Directions - Measure the total length of the wetland perimeter on overlay 2 using a map wheel. Then measure the length of the wetland perimeter bordered by a 500 foot buffer zone. Express the length of the buffer as a percentage of the total length of the wetland perimeter:

$$\frac{\text{Length of Buffer Zone Perimeter (feet)}}{\text{Total Length of Wetland Perimeter (feet)}} \times 100$$

Rationale – A buffer zone (uncut and/or undisturbed area of vegetation providing wildlife cover) increases the wildlife habitat potential of a wetland in several important ways. First, it provides upland habitat for both upland animals, which may use wetlands during certain parts of their life cycle, and for wetland dependent species which require upland habitat for certain parts of their life cycle. Second, a buffer zone decreases the amount of disturbance within the wetland itself. This is particularly important for nesting birds which may be disturbed by people and household pets.

V.1.7 QUESTION 7 – *Level of human activity WITHIN WETLAND as evidenced by litter, bike trails, roads, residences, etc.*

Directions - Estimate the level of human activity **in the wetland** based on criteria provided on the data sheet. This may necessitate visiting the wetland during different times of the day or year to observe the amount of activity.

Rationale – Wetlands can suffer from too much human activity. The entire wetland ecosystem may be affected because of disturbances to the plant and animal communities. Bogs, in particular, are very delicate environments. They are generally nutrient poor ecosystems which have developed slowly over several thousand years. Disturbed bogs may take many years to recover and may, in fact, never recover if the organic substrate is removed.

V.1.8 QUESTION 8 – *Level of human activity IN UPLAND within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.*

Directions - Estimate the level of human activity **in the upland** based on criteria provided on the data sheet. This may necessitate visiting the adjacent upland areas during different times of the day or year to observe the amount of activity.

Rationale – Human activity in the upland bordering the wetland can have significant disturbance effects in the wetland itself. The N.H. Method assumes that the ecological integrity of the wetland is enhanced by relatively undisturbed conditions in the bordering upland.

V.1.9 QUESTION 9 – *Percent of wetland plant community presently being altered by mowing, grazing, farming or other activity.*

Directions - Determine the area of all pastures, mowed areas, and recent (5 years) clear cuts within the wetland (include areas now dominated by phragmites or purple loosestrife). Express as a percent of total wetland area:

$$\frac{\text{Area of Alteration (acres)}}{\text{Total Wetland Area (acres)}} \times 100$$

Rationale – Human activities such as plowing, mowing, pasturing, clear cutting, or land clearing can drastically alter the plant community of a wetland. Two invasive plant species, namely phragmites (common reed) and purple loosestrife, are particularly adept at invading, and ultimately dominating, disturbed wetlands. These plants have little wildlife value and can form dense stands which crowd out other more valuable plant species. This process can significantly reduce the number of animals in the wetland. The result is a loss in the natural diversity of the wetland.

V.1.10 QUESTION 10 – *Percent of wetland actively being drained for agriculture or other purposes.*

Directions - Measure the area that is actively being drained (recorded on overlay 2). Express as a percent of the total wetland area:

$$\frac{\text{Area of Active Drainage (acres)}}{\text{Total Wetland Area (acres)}} \times 100$$

Rationale – Artificial drainage systems can radically alter the hydrology of a wetland. Where drainage is occurring, the soil moisture of a wetland can be reduced to a point that the area will no longer support wetland plants. In addition, drainage can alter the boundaries of the wetland.

V.1.11 QUESTION 11 – *Number of public road and/or railroad crossing per 500 feet of wetland (measured along long axis of wetland).*

Directions - Measure the long axis of the wetland (this generally follows the longest stream channel). The measurement should be taken along the longest axis of the wetland. If there are numerous crossing along shorter axis, then calculate these individually, and the total the individual axis. Express the measurement in feet. All road crossings should be noted on the wetland base map. "Road Crossings" are defined according to the following criteria:

a. Every stream/river crossing within the wetland.
b. Roads and/or railroads that are parallel to and border the edge of the wetland.
c. Where the same road crosses a wetland at several different points, count each crossing.

Step 1: $$\frac{\text{Distance Along Long Axis (feet)}}{\text{500 (feet)}} = X$$

Step 2: $$\text{Number of crossings per 500 feet of wetland} = \frac{\text{Number of road crossings}}{\text{X (answer from step 1)}}$$

Rationale – Roads provide access to wetlands which might otherwise remain undisturbed. Road crossings are also potential sites for the introduction of water pollutants such as road salt, oil and spilled chemicals into the wetland. In addition, road and railroad crossings can fragment the wetland unit to a certain extent.

V.1.12 QUESTION 12 – *Long term stability.*

Directions - Examine the downstream limit of the wetland. Determine whether or not the water level in the wetland is dependent on artificial impoundments such as a beaver dam or another dam. Try to determine the extent to which the wetland is dependent on such a structure. Some dams only raise the water level of natural ponds. Others create ponds and wetlands where they did not originally exist. For example, there might be 5 acres of water surrounded by emergent vegetation and impounded behind a dam. In this case, answer – b "Wetland appears to be somewhat dependent on artificial diking dam, road, fill, etc." would be appropriate.

Rationale – Wetlands which are the result of artificial impoundments may not be as long lived as naturally occurring wetlands. Older dams, such as stone mill dams and earthen dams, may weaken over time and breach, (or be removed by the owner to avoid liability or potential repair costs) ultimately draining or otherwise altering the upstream wetland.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 1
ECOLOGICAL INTEGRITY

- Zoning map
- NRCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Map wheel (optional)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetlands having very poorly drained soils or Hydric A soils and/or open water.		a. More than 50 percent	1.0
		b. From 25 to 50 percent	0.5
		c. Less than 25 percent	0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.		a. Agriculture, forestry, or similar open space zoning	1.0
		b. Rural residential	0.5
		c. Commercial/industrial, high density residential	0.1
QUESTIONS TO BE ANSWERED IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.		a. High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards	1.0
		b. Medium: Moderate pollution. Actual water quality is below Class B standards	0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetlands (acres).		a. Less than 1 bldg: 10 acres (<0.10)	1.0
		b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50)	0.5
		c. More than 1 bldg: 2 acres (>0.5)	0.1
5. Percent of original wetland filled.		a. Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent	1.0
		b. From 20 to 80 percent	0.5
		c. Less than 20 percent	0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		a. Low level: Few trails in use and/or sparse litter	1.0
		b. Moderate level: Some used trails, roads, etc.	0.5
		c. High level: Many trails, roads, etc. within wetland	0.1

Wetland Name/Code:________________________________

Functional Value 1
ECOLOGICAL INTEGRITY
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO BE ANSWERED IN THE FIELD (continued)**:**			
8. Level of human activity **IN UPLAND** as evidenced by litter, bike trails, roads, residences, etc.		a. Low level: Few trails in use and/or sparse litter	1.0
		b. Moderate level: Some trails, scattered residences, etc.	0.5
		c. High level: Many trails, roads, etc. within upland	0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		a. Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		a. Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).		a. None	1.0
		b. One or fewer	0.5
		c. Two or more	0.1
12. Long-tern stability.		a. Wetland appears to be naturally occurring, not impounded by dam or dike	1.0
		b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 1 = Total area of wetland = ________________ acres.

V.2 FUNCTIONAL VALUE 2 – WETLAND WILDLIFE HABITAT

Habitat can be defined as a locality or environment in which organisms live. The N.H. Method does not attempt to evaluate the wetland as habitat for a particular wildlife species (existing methods such as the Habitat Evaluation Procedure (U.S. Fish & Wildlife Service, 1980) are well suited for that purpose). Rather, it attempts to assess the overall suitability of a wetland for that group of wildlife species which are intimately associated with wetlands.

Wetlands represent a continuum bounded by uplands at one extreme and deep water habitats at the other. In terms of wetlands classes, emergent wetlands (marshes) fall toward the wetter end of the continuum while scrub/shrub and forested wetlands occur successively toward the dryer end. Generally speaking, the wetter a wetland, the more likely it is to provide habitat for animals which are highly dependent on wetlands. For example, marshes, particularly those which have a variety of plant species together with some open water, provide habitat for a large number of truly wetland species, such as waterfowl and wading birds.

Wooded and shrub swamps, on the other hand, provide habitat for wetland species to a lesser degree. Bogs and wet meadows, because of their less diverse plant communities, provide fewer ecological niches for wetland species. However, this should not be construed to mean that the habitats provided by these wetlands are without value. Wooded wetlands at the dryer end of the spectrum may provide habitat for a variety of upland species. This Functional Value, however, concentrates on those species which are most dependent on emergent (marsh type) wetlands for habitat.

QUESTIONS TO ANSWER IN THE OFFICE:

V.2.1 Question 1 – *Ecological Integrity.*

Directions **-** Record the Average FVI from Functional Value 1.

Rationale – The N.H. Method assumes that those wetlands which are the least degraded by human activity provide the highest quality habitat.

V.2.2 Question 2 – *Area of shallow permanent open water (less than 6.6 feet deep), including steams in or adjacent to wetland.*

Directions – Measure the area of open water from overlay 2. Open water is defined in the N.H. Method as standing water having less than 30 percent of its area covered by trees, shrubs and rooted emergent vegetation. Aerial photographs may be the best reference for this assessment.

Rationale – Open water is essential to a number of wetland wildlife species including waterfowl, wading birds, amphibians, and some reptiles.

QUESTIONS TO ANSWER IN THE FIELD:

V.2.3 Question 3 – *Water quality of the watercourse, pond, or lake associated with the wetland.*

Directions – As for Question V.1.3.

Rationale – As for Question V.1.3.

V.2.4 Question 4 – *Wetland diversity.*

Directions – Total the number of wetland classes (each of which should occupy >20% of total wetland area) previously identified on overlay 2.

Rationale – In northeastern wetlands, vegetation is the most important component of wildlife habitat. It is widely recognized that diversity in the plant community increases the diversity of the animal community. Since each wetland class represents a different plant community, the more wetland classes that are present in a wetland, the more diverse the overall plant community of the wetland. In addition, having two wetland classes adjacent to each other may improve the wildlife habitat value over each alone because some wetland wildlife species, such as the alder flycatcher and common yellow throat, utilize the edge between two different plant communities.

V.2.5 Question 5 – *Dominant wetland class.*

Directions – Determine in the field (or from overlay 2) which wetland class dominates the wetland.

Rationale – The N.H. Method assumes that marshes associated with open water are an essential habitat for a large number of truly wetland species, particularly waterfowl and wading birds. This Functional Value therefore gives the highest weight to this wetland type. Wooded and shrub swamps provide habitat for wetland species to a lesser degree. Bogs and wet meadows, because of their less diverse plant communities, provide fewer ecological niches.

V.2.6 Question 6 – *Interspersion of vegetation classes and/or open water.*

Directions – Determine from overlay 2 the degree of interspersion of the vegetation types (wetland classes including open water) present. Specifically determine whether one or more of the classes occurs as a series of patches scattered throughout the other class or classes. For example, patches of scrub/shrub wetland might be scattered throughout a marsh. This is in contrast to a scrub/shrub wetland which may surround a marsh.

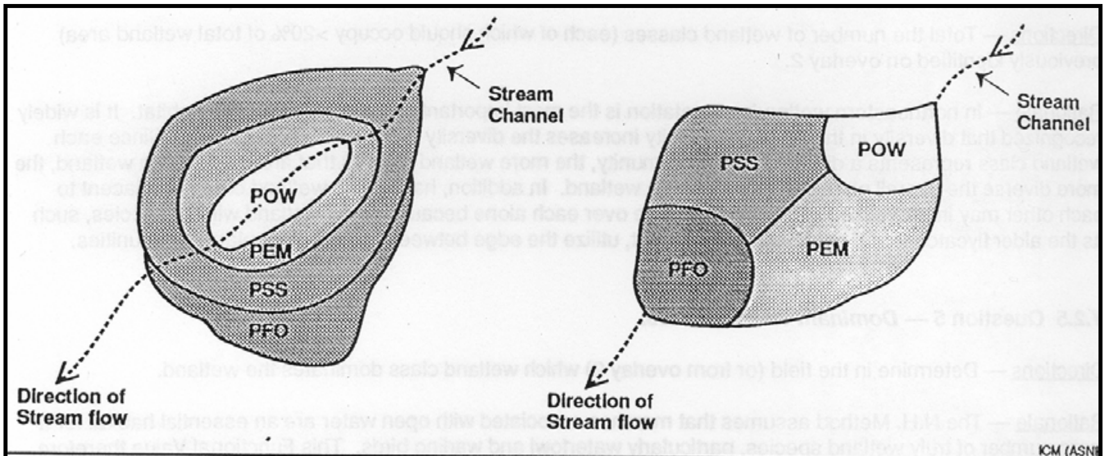
Rationale – The interspersion of vegetation types is the scattering or intermingling of two or more vegetation types (wetland classes) throughout an area. For example, in a wetland composed of approximately concentric bands of vegetation (Figure V.2.1a), such as cattails ringed by shrubs, interspersion would be low. At the opposite extreme, small patches of shrubs scattered throughout a marsh (Figure V.2.1b) represent a high degree of interspersion.

When two or more vegetation types, such as forested wetland and emergent wetland, are highly interspersed, a great deal of edge is created. "Edge" is simply the term given to the border between two vegetation types or between a vegetation type and open water. Edge is very important because many wildlife species are edge dwellers. Generally, it is assumed that the greater the edge in a given area, the greater the diversity (number of species) of wildlife.

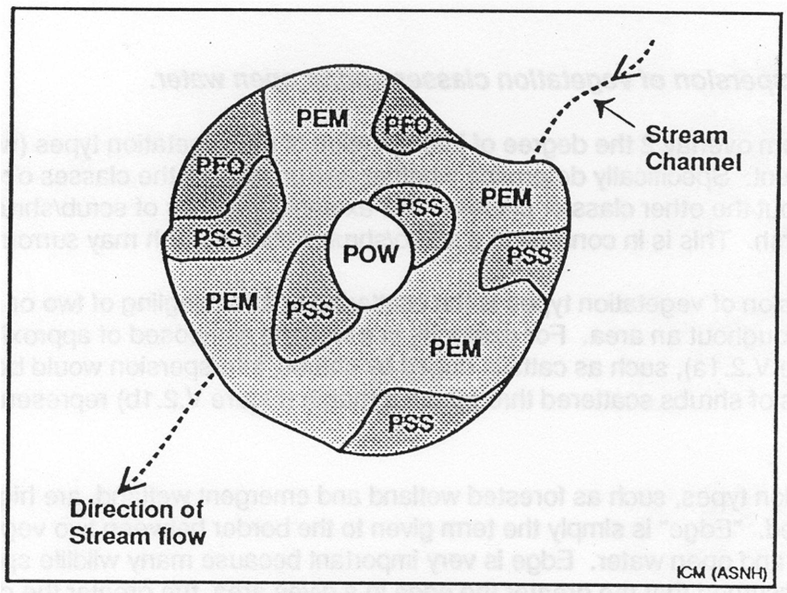
V.2.7 Question 7 – *Wetland juxtaposition.*

Directions – Determine whether or not the wetland is hydrologically connected to other wetlands (i.e. whether or not a perennial stream or lake connects the wetland being evaluated to other wetlands), or located in close proximity to other wetlands.

Rationale – Proximity to other wetlands, particularly if there is a water connection, enhances the wildlife value of a wetland. Birds, such as a great blue heron, may roost in one wetland and travel to other wetlands to fish. Juxtaposition is enhanced when hydrologically connected wetlands contain wetland classes which are absent in the evaluation wetland. For example, there may be no open water in the evaluation wetland but water may be present in a neighboring wetland. This water would enhance the wildlife habitat value of the evaluation wetland because some species of birds which have a requirement for open water could fly to the second wetland.



V.2.1a Low Interspersion



V.2.1b High Interspersion

KEY:

PFO = Palustrine, forested
PSS = Palustrine, scrub shrub
PEM = Palustrine, emergent
POW = Palustrine, open water

Figure V.2.1 Interspersion of Vegetation Classes.
Figure V.2.1a presents two hypothetical examples of low interspersion.
Figure V.2.1b presents a hypothetical example of high interspersion between vegetation classes.

V.2.8 Question 8 – *Number of islands or inclusions of upland within wetland.*

Directions – Determine in the field (or from overlay 2) the number of islands and/or inclusions within the wetland boundary.

Rationale – An island, as used here, simply means an area of upland surrounded by water. An inclusion is an area of upland surrounded by wetland. Because they are relatively inaccessible, islands and/or upland inclusions are often undisturbed by humans and household pets. These areas, therefore, provide sanctuaries for wildlife, particularly in developing areas where other habitats have been disturbed or destroyed.

V.2.9 Question 9 – *Wildlife access to other wetlands (overland).*

Directions – Determine the presence of potential travel lanes for wildlife between the wetland being evaluated and other nearby wetlands. Travel lanes should be areas of dense vegetation 50 to 100 feet in width. Very often these will run along the main stream and tributaries. Obstructions to travel lanes night include complete or partial blockage by roads, urban areas, etc.

Rationale – Access to other wetlands is important in maintaining animal populations. A wetland which is part of an interconnected system of wetlands can be expected to support more species of animals than a single isolated wetland.

V.2.10 Question 10 – *Percent of wetland edge bordered by upland wildlife habitat (brushland, woodland, active farmland, or idle land) at least 500 feet in width.*

Directions – As for Question V.1.6, but the evaluation criteria in Column C are different. **Note:** This question includes active farmland which is not included in Question V.1.6.

Rationale – As for Question V.1.6. Active farmland is included because it generally provides a good buffer for wildlife habitat. However, the potential exists for nutrients and pesticide pollution from agriculture land use, therefore it was not included in Question V.1.6.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 2

WETLAND WILDLIFE HABITAT

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI for Functional Value 1	______
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent wetland.		a. More than 3 acres b. From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water Quality of the watercourse, pond, or lake associated with the wetland.		FVI from Question V.1.3	_______
4. Wetland diversity.		a. Three or more wetland classes present b. Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt. b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page…..

Wetland Name/Code:________________________________

Functional Value 2
WETLAND WILDLIFE HABITAT
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and not other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 2 = Total area of wetland = ________________ acres.

V.3 FUNCTIONAL VALUE 3 – FINFISH HABITAT OF WATERCOURSES AND/OR LAKES ASSOCIATED WITH THE WETLAND.

This Functional Value looks at the ability of streams and lakes associated with the wetland to function as finfish habitat. The term "associated with" means streams and lakes which are within the wetland or which border the wetland. The evaluation should be done on the reach of a stream or section of lake which actually borders or is contained within the wetland.

The evaluation of Finfish Habitat is divided into two parts. Part A evaluates the habitat of perennial rivers and streams associated with the wetland. If there is no watercourse associated with the wetland, the watercourse is less than two feet wide, or the stream is intermittent, then leave Part A out of the evaluation and proceed to Part B. Part B evaluates the Finfish Habitat of ponds and/or lakes associated with the wetland.

If there is neither a watercourse nor a pond or lake associated with the wetland, then leave this Functional Value out of the evaluation.

PART A: RIVERS AND STREAMS

QUESTIONS TO ANSWER IN THE OFFICE:

V.3.1A (Part A) Question 1 – ***Dominant land use in watershed above wetland.***

Directions **-** Determine the dominant land use (more than 50% coverage) in the watershed using aerial photographs, topographic maps, or field visits.

Rationale – Generally fish habitat deteriorates as land use changes from forestland to agriculture to urban land.

QUESTIONS TO ANSWER IN THE FIELD:

V.3.2A (Part A) Question 2 – ***Water quality of the watercourse associated with the wetland.***

Directions – As for Question V.1.3.

Rationale – Poor water quality can be harmful to many species of aquatic life. Indeed the whole character of the wetland ecosystem can change when it is exposed to excess nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies which in turn can cause a change in the species composition of both the plant and animal communities.

V.3.3A (Part A) Question 3 – ***Barrier(s) to anadromous fish (such as dams [including beaver dams, waterfalls, road crossings, etc.) along the stream reach associated with the wetland.***

Directions – Determine if there are any of the following instream barriers to fish passage at or near the wetland. It may be difficult to generalize about what constitutes such a barrier. The method assumes that a barrier exists if:

1. The stream flows through a culvert without a fully or partially submerged outlet. (i.e., the outlet end of the culvert is not submerged.)
2. The stream flows through a culvert or other opening with a surface velocity more than 8 feet per second.
3. The stream drops more than 8" over a weir spillway.

Rationale – Fish passage is essential to anadromous fish such as salmon, shad, and alewives. Other fish may also move up and downstream to locate suitable spawning areas.

V.3.4A (Part A) Question 4– *Stream width (bank to bank).*

Directions – Determine the average width of the stream (in feet) within the wetland during times of low flow.

Rationale – Streams more than 50 feet in width are assumed to be major rivers and as such are very important habitat for fish. Streams less than two feet in width are generally too small to provide more than minimal fish habitat.

V.3.5A (Part A) Question 5 – *Available shade.*

Directions – Determine if the streamside vegetation is of sufficient height to provide shade for the stream. Vegetation should be woodland, scrubland, or other vegetation taller than six feet for most of the watercourse.

Rationale – High water temperatures which result from the removal of streamside vegetation can make a stream unsuitable for some fish species. Trout are particularly susceptible to elevated water temperatures. Historically, many streams in New Hampshire have become unsuitable for trout as the surrounding land was cleared for agriculture and other purposes. This was in part due to a raising of stream temperatures.

V.3.6A (Part A) Question 6 – *Physical character of stream channel associated with wetland.*

Directions – Determine the stream channel type. Stream gradient can be estimated in the field or from a USGS topographic map (An example of how to calculate stream gradient is given in Appendix F.2). Low gradient (slow flowing) streams characteristically have ox bows and silty bottoms. Steeper gradient streams generally have sand, gravel and rock bottoms and the channel alternates between pools and riffles. A modified stream is one that has been altered (by excavation, debris removal, clearing of vegetation, etc.) for some purpose and is devoid of the above characteristics of natural stream channels.

Rationale – Both low and higher gradient streams can provide habitat for fish (although generally the species composition of the two types of streams are different). Streams that are artificially channelized, however, usually have a lower habitat value for fish than natural stream channels.

V.3.7A (Part A) Question 7 – *Abundance of cover objects.*

Directions – Estimate the percentage of the wetland area that has an abundance of cover objects such as submerged logs, rocks, etc., using the criteria provided in Column C on the data sheet.

Rationale – Cover is an important component of fish habitat. For example, it provides refuge from predators, and serves as substrate for insect larvae that are a food source for some fish species.

V.3.8A (Part A) Question 8 – *Spawning areas.*

Directions – Determine if there are areas of low growing vegetation that are flooded for several weeks in the spring and/or areas of gravel.

Rationale – Seasonally flooded vegetation is important as spawning areas for warm water fish. Such areas are normally found in low gradient streams which tend to be warmer than higher gradient streams. Gravel beds, on the other hand, are important for cold water fish and are found in higher gradient streams. This question recognizes that both warm and cold water streams can be valuable as fish habitat. In other words, answer "A" is applicable if there is good warm water spawning habitat such as submerged vegetation or if there is good cold water spawning habitat such as gravel beds.

Wetland Name/Code:_______________________________

NEEDED FOR THIS EVALUATION

- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map
- Recent aerial photographs
- Anadromous Fish Run information
- Fish stocking information

Functional Value 3

FINFISH HABITAT

Streams & Rivers

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A – STREAMS AND RIVERS		**Note:** If investigation reveals no year-round stream is present enter zero for this Functional Value (Column "D" on summary sheet) and proceed to Part B.	
Name of Stream (If applicable)	________________	______________________	
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Dominant land use in watershed above wetland.		a. Woodland, wetland, or abandoned farmland	1.0
		b. Active farmland or rural residential	0.5
		c. Urban and heavily developed suburban areas	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
2. Water Quality of the watercourse associated with the wetland.		FVI from Question V.1.3	_______
3. Barrier(s) to anadromous fish (such as dams, beaver dams, waterfalls, road crossings, etc.) along the stream reach associated with the wetland.		a. No barrier(s) present, or if present equipped with fish ladders or other provisions for fish passage, **OR** water body is beyond the range of anadromous fish	1.0
		b. Artificial barrier(s) present without provisions for fish passage, **AND** river/stream is within range of anadromous fish	0.1
4. Stream width (bank to bank).		a. More than 50 feet	1.0
		b. From 2 to 50 feet	0.5
		c. Less than 2 feet	0.1

Continued on next page…..

Wetland Name/Code:________________________________

Functional Value 3
FINFISH HABITAT
Streams and Rivers
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A – STREAMS AND RIVERS (continued) QUESTIONS TO ANSWER IN FIELD			
5. Available shade.		a. Woodland, scrubland, or other tall vegetation provides shade to all or significant portion of the stream (>50% cover)	1.0
		b. Portions of the stream bank unvegetated **OR** vegetation to low (<6') to provide shade (25-50% cover)	0.5
		c. Major portions of stream bank vegetation to low (<6') to provide shade, OR unvegetated (<25% cover)	0.1
6. Physical character of stream channel associated with wetland		a. Stream is in a natural channel, either a meandering low gradient (less than 0.2%) stream, **OR** moderate to high (0.2% or higher) gradient stream with pools and riffles	1.0
		b. Portions of stream recently modified, **OR** stream formerly channelized but has regained some natural channel features through the onset of meandering, the regrowth of instream vegetation, or the addition of cover objects such as rocks or snags	0.5
		c. Stream has recently been channelized, **OR** stream is confined in a nonvegetated chute or pipe	0.1

Wetland Name/Code:________________________________

Functional Value 3
FINFISH HABITAT
Streams and Rivers
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A – STREAMS AND RIVERS (continued)			
QUESTIONS TO ANSWER IN FIELD			
7. Abundance of cover objects.		a. Abundant: More than 70% of water area contains cover objects such as submerged logs, undercut banks, and floating or submerged vegetation (might be seasonal)	1.0
		b. Moderately abundant: From 30 to 70% of water area contains cover objects	0.5
		c. Scarce: Less than 30% of the water area contains cover objects	0.1
8. Spawning areas.		a. Low gradient, slow moving stream with abundant areas of grass and low growing emergent vegetation present which are flooded for several weeks in the spring, **OR** a medium or high gradient stream with abundant areas of gravel suitable for spawning	1.0
		b. Moderate amount of spawning areas present	0.5
		c. Few spawning areas present	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 3, PART A = Average of column D for Part A= ______________.

EVALUATION AREA FOR PART A: FUNTIONAL VALUE 3 = Area of stream or river
Associated with wetland = _________________ acres.

PART B: LAKES AND PONDS

QUESTIONS TO ANSWER IN THE OFFICE:

V.3.1B (Part B) Question 1 – *Dominant land use in watershed above wetland.*

<u>Directions</u> **-** As for Question V.3.1A, Part A.

<u>Rationale</u> – As for Question V.3.1A, Part A.

QUESTIONS TO ANSWER IN THE FIELD:

V.3.2B (Part B) Question 2 – *Water quality of the pond or lake associated with the wetland.*

<u>Directions</u> – As for Question V.1.3.

<u>Rationale</u> – As for Question V.1.3

V.3.3B (Part B) Question 3 – *Barrier(s) to anadromous fish.*

<u>Directions</u> – As for Question V.3.3A, Part A.

<u>Rationale</u> – As for Question V.3.3A, Part A.

V.3.4B (Part B) Question 4 – *Total area of pond or lake, including areas of rooted, submerged, and emergent vegetation.*

<u>Directions</u> – Determine the area (in acres) of the pond/lake being evaluated. The area of many ponds and lakes in New Hampshire, as well as other information which can be used in this section of the N.H. Method, can be found in N.H. DES and N.H. Fish and Game Department publications. If these are unavailable, the area of the water body can be measured from the wetland base map using the dot grid method or a planimeter.

<u>Rationale</u> – In general, the larger water bodies of New Hampshire provide habitat for the widest variety of fish species.

V.3.5B (Part B) Question 5 – *Abundance of cover objects.*

<u>Directions</u> – Determine whether or not cover objects (rocks, aquatic vegetation, etc.) are visible along the shoreline of the water body.

<u>Rationale</u> – As for Question V.3.7A, Part A.

V.3.6B (Part B) Question 6 – *Percent of pond or lake having rooted submerged or emergent vegetation.*

<u>Directions</u> – From a boat or from the shore, determine those areas having rooted submerged or emergent vegetation. Examine this area and express as a percent of the total lake area. This will vary through the seasons. Mid-to-late summer is the best time to estimate the area of submerged or emergent vegetation. For example, if a wetland is evaluated in early spring, you may find no vegetation in a pond you know typically has summer growth. In this case you may wish to exclude this question from the calculation documenting the appropriate reasons for doing so.

<u>Rationale</u> – Areas of vegetation are important to fish for food and cover. Some fish species nest in areas of submerged vegetation. Rooted aquatic plants provide a substrate for microorganisms and small aquatic insects which are important food sources for some fish species.

Wetland Name/Code:______________________________

NEEDED FOR THIS EVALUATION

- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map
- Recent aerial photographs
- Anadromous Fish Run information
- A method to calculate area (Dot grid, planimeter, etc.)

Functional Value 3

FINFISH HABITAT

Lakes and Ponds

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART B – Lakes and Ponds			
QUESTIONS TO ANSWER IN THE FIELD:			
1. Dominant land use in watershed above wetland.		FVI for Question V.3.1A	_______
2. Water quality of pond or lake associated with wetland.		FVI for Question V.1.3	_______
3. Barrier(s) to anadromous fish (such as dams, beaver dams, waterfalls, road crossings, etc.).		a. No barrier(s) present, or if present equipped with fish ladders or other provisions for fish passage, **OR** water body is beyond range of anadromous fish	1.0
		b. Artificial barrier(s) present without provisions for fish passage, **AND** river/stream is within range of anadromous fish	0.1
4. Total area of pond or lake, including areas of rooted, submerged and emergent vegetation.		a. More than 100 acres	1.0
		b. From 10 to 100 acres	0.5
		c. Less than 10 acres	0.1
5. Abundance of cover objects.		a. Abundant: More than 70% of area visible from shore contains cover objects such as submerged logs, rocks, etc.	1.0
		b. Moderate: From 30 to 70% of area visible from shore contains cover objects	0.5
		c. Scarce: Less than 30% of area visible from shore contains cover objects	0.1
6. Percent of pond or lake having rooted submerged or emergent vegetation.		a. From 15 to 50%	1.0
		b. More than 50% or less than 15%	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 3, PART B = Average of column D for Part B= _____________.

EVALUATION AREA FOR PART B, FUNTIONAL VALUE 3 = Area of pond or lake associated with wetland = _________ acres.

V.4 FUNCTIONAL VALUE 4 – EDUCATIONAL POTENTIAL

Field trips are considered an important part of the educational process. Wetland field trips are particularly important for teaching ecological principles from the microscopic to the macroscopic level. The N.H. Method assesses the educational potential of wetlands in terms of access to the widest variety of wetland types. You will need to determine the area of the potential educational site. This area may include the entire wetland, or if the wetland is large it is possible that only a portion of it will be used (based on visibility, accessibility, etc.). Mark the location of the potential educational site on the wetland base map.

QUESTIONS TO ANSWER IN THE OFFICE:

V.4.1 Question 1 – *Ecological integrity.*

Directions **-** Record the Average FVI from Functional Value 1.

Rationale – The N.H. Method assumes that a student's first exposure to ecological principles should be in a naturally functioning ecosystem.

V.4.2 Question 2 – *Wetland wildlife habitat.*

Directions **-** Record the Average FVI from Functional Value 2.

Rationale – The educational potential of a site is enhanced by high value wildlife habitat.

V.4.3 Question 3 – *Proximity of potential educational site to schools.*

Directions **-** Determine the approximate travel time from the school of interest to the wetland based on speed limits, traffic conditions, etc.

Rationale – Short travel time allows field trips with a minimum disruption to class schedules. In addition, short travel times reduce transportation problems.

V.4.4 Question 4 – *Presence of a nature preserve or wildlife management area.*

Directions **-** Determine if the wetland is included in a nature preserve or wildlife management area. Look for evidence of wildlife management practices such as nest boxes and/or food plots. Is the area being managed as a preserve for some particular habitat or natural feature such as a bog? Very often nature preserves and wildlife management areas are well marked with signs.

Rationale – Management for wildlife and/or particular plant communities should increase opportunities for wildlife observation, plant identification, etc., as well as providing an opportunity to study the management practices themselves. Some areas that are managed for wildlife or rare plants may be closed to visitation. This should be checked before this question is answered. It may be possible to reach an agreement with the managers to allow supervised educational activities. Wetlands that are protected for wildlife and/or plant communities but not formally managed may include conservation easements, conservation district areas, etc.

QUESTIONS TO ANSWER IN THE FIELD:

V.4.5 Question 5 – *Proximity of potential educational site to other plant communities.*

Directions – Examine the area near the educational site for other plant communities such as abandoned farmland or forestland.

Rationale – The presence of these plant communities increases the educational value of the wetland by allowing students to compare and contrast wetlands and uplands.

V.4.6 Question 6 – *Off-road parking at potential educational site suitable for school buses.*

Directions – Examine the area around the wetland to determine if such parking areas exist. Suitable parking areas might include public and private parking areas, abandoned farm lanes, and road shoulders.

Rationale – A suitable parking area close to the potential educational site is important not only for student safety, but also to reduce overall travel time.

V.4.7 Question 7 – *Number of wetland classes accessible or potentially accessible for study at potential educational site.*

Directions – Locate all wetland classes which are a short walk from the parking area (see overlay 2). Determine their accessibility. For example, are they separated from the educational site by a stream or other barrier? For the purposes of this evaluation assume the site will be visited by students from grade school to high school.

Rationale – The N.H. Method assumes that several wetland types in close proximity provide the best educational opportunity.

V.4.8 Question 8 – *Access to perennial stream at potential educational site.*

Directions – Determine if access to a stream is feasible. Normally access would require dry ground to the water's edge. Stream access could also be at a road crossing, but consider student safety at such locations.

Rationale – Access to a stream provides opportunities to study the ecology of flowing water. Students can collect water samples as well as study bottom dwelling invertebrates and other aquatic life.

V.4.9 Question 9 – *Access to pond or lake at potential educational site.*

Directions – Determine if access to a pond or lake is feasible. Access to a pond or lake would generally require dry ground to the water's edge.

Rationale – Access to a pond or lake provides opportunities to study the ecology of still water which can be quite different from that of running water. Students can examine such things as the distribution of planktonic organisms and the concentration of dissolved oxygen at various depths.

V.4.10 Question 10 – *Student safety.*

Directions – Examine the potential educational site for possible hazards, such as busy roads, railroad trestles, etc.

Rationale – A safety hazard is an obvious drawback to an educational site.

V.4.11 Question 11 – *Public access to potential educational site.*

Directions – Determine the extent to which the public has access to the site. Are there broken bottles, damaged signs, etc., which indicate that a nature study area would be subject to vandalism?

Rationale – Ideally, a study area could be set up with informative markers, study plots, etc. This would greatly increase the educational value of the area.

V.4.12 Question 12 – *Visual/Aesthetic quality of potential educational site.*

Directions – Examine the area in and around the potential educational site. Look for visual detractors such as litter, abandoned cars, shopping carts, etc.

Rationale – The N.H. Method assumes that areas which are visually unappealing are not conducive to study. In addition, such areas do not foster a sense of the natural beauty of wetlands among the students.

V.4.13 Question 13 – *Handicap accessibility.*

Directions – Determine whether the wetland is accessible to the handicapped, e.g. nature trails designed for the handicapped, special handicapped access points (parking, etc.). Give details of the accessibility in the comments section of the data sheet.

Rationale – The educational potential of a wetland is increased if it is accessible to both handicapped and non-handicapped persons alike.

Wetland Name/Code:_______________________________

NEEDED FOR THIS EVALUATION

Functional Value 4
EDUCATIONAL POTENTIAL

- USGS topographic map
- Land use map or recent aerial photograph
- Ruler or scale
- Method to calculate area (Dot grid or planimeter)
- Knowledge of any management activities by local nature centers, sanctuaries, scouting groups, garden clubs, etc.

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
Location of potential educational site:		________________________	
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	_______
2. Wetland wildlife habitat		Average FVI from Functional Value 2	_______
3. Proximity of potential educational site to schools.		a. Within safe walking distance	1.0
		b. Within 20 minutes drive	0.5
		c. More than 20 minutes drive	0.1
4. Presence of a nature preserve or wildlife management area.		a. Wetland within an organized nature preserve or wildlife management area	1.0
		b. Wetland in a conservation easement or district but not under active management	0.5
		c. Area not under such management, or areas closed because of the presence of rare plants or other environmental considerations	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
5. Proximity of potential educational site to other plant communities.		a. Upland forest or abandoned farmland in various stages of secondary succession within a short walk to potential educational site	1.0
		b. Potential educational site is not within a short walk to other plant communities	0.1
6. Off-road parking at potential educational site suitable for school buses.		a. Wetland within walking distance, or a suitable parking area is in close proximity to the educational site	1.0
		b. Moderate expense required to develop parking area within close proximity to the educational site	0.5
		c. Parking within close proximity of the educational site not available, or expensive to develop because of traffic flow, soil suitability, or other problems	0.1

Wetland Name/Code:________________________________

Functional Value 4
Educational Potential
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Function al Value Index (FVI)
QUESTIONS TO ANSWER IN FIELD (continued)			
7. Number of wetland classes accessible or potentially accessible for study at potential educational site.		a. Three or more classes	1.0
		b. Two classes	0.5
		c. One class	0.1
8. Access to perennial stream at potential educational site		a. Direct access available	1.0
		b. Water access not available but feasible to develop	0.5
		c. Perennial stream not present, or access not feasible	0.1
9. Access to pond or lake at potential educational site.		a. Direct access available	1.0
		b. Access not available but feasible to develop	0.5
		c. Pond or lake not present, or access not feasible	0.1
10. Student safety		a. No known safety hazards such as busy roads, steep embankments, railroad trestle, etc. within potential educational site	1.0
		b. One or more safety hazards present which could be over-come at moderate expense	0.5
		c. Obvious safety hazards which would be difficult and/or expensive to overcome	0.1
11. Public access to potential educational site.		a. Public access prohibited or controlled. Interference with study area or equipment unlikely	1.0
		b. Some public access by general public, but at a level which will not greatly interfere with the study area.	0.5
		c. Unlimited public access that cannot easily be controlled and which would be likely to interfere with study area or equipment.	0.1

Wetland Name/Code:________________________________

Functional Value 4

Educational Potential

(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
12. Visual/aesthetic quality of potential educational site.		a. Undisturbed and natural. No aesthetic detractors such as litter, abandoned cars, land fills, road noise, etc. or if such detractors are present, they could be easily corrected	1.0
		b. Limited disturbance. Minor detractors present and difficult to correct.	0.5
		c. Severe disturbance. Major detractors present which would be difficult to correct.	0.1
13. Handicap accessibility.		a. Yes	1.0
		b. No	0.0

AVERAGE FVI FOR FUNCTIONAL VALUE 4 = Average of column D= _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 4 = **AREA*** of potential educational site = ________________ acres.

***AREA** - May represent the entire wetland, or if the wetland is quite large it is possible that only a portion of it will be used (that which is visible, accessible, etc.)

V.5 FUNCTIONAL VALUE 5 – VISUAL/AESTHETIC QUALITY

Wetlands can be areas of scenic beauty. Most often wetlands are viewed from public roads, but other important viewing locations might be along a stream, from a canoe, along a nature trail, or from an overlook. Because some wetlands are large and can be viewed from several locations, it is important to note on the wetland base map which viewing location(s) are being evaluated. The average FVI can be based on an average of several viewpoints or the wetland can be rated on one outstanding viewpoint. The evaluation area may include the entire wetland, or if the wetland is large, it is possible that only a portion(s) will be used, e.g. an area that is clearly visible from a road or stream.

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.5.1 Question 1 – *Number of wetland classes visible from primary viewing location(s).*

Directions **-** Determine the location(s) from which the wetland can be viewed. Decide which location(s) will be used in the rating and note it (them) on the wetland base map. At this location(s) determine the number of wetland types or classes which are visible.

Rationale – The N.H. Method assumes that scenic diversity (i.e. several different plant communities visible at one time) increases visual quality.

V.5.2 Question 2 – *Dominant wetland class visible from primary viewing location(s).*

Directions **-** Determining this is somewhat subjective. The dominant wetland class is not necessarily the class covering the largest area. For example, a marsh may so contrast with a surrounding wooded swamp as to dominate the view even though the wooded swamp may actually be larger.

Rationale – Marshes, with or without open water, are assumed to be the most widely recognizable wetland type and are therefore given the highest value. In addition, marshes, especially those with low growing vegetation, can provide a dramatic panoramic view. Shrub swamps and wooded wetlands are not always visually different at a distance from their upland counterparts, shrubby upland and upland forest.

V.5.3 Question 3 – *Noise level at primary viewing location(s).*

Directions **-** In most cases, it will be sufficient to judge the sound level after a period of careful listening.

Rationale – Subjective impressions of noise levels vary from person to person, but it is assumed that continual noise, such as that from a busy highway detracts significantly from the aesthetic appreciation of wetlands. Noise can be particularly distracting when listening for bird songs and other wildlife sounds.

V.5.4 Question 4 – *Odors present at primary viewing location(s).*

Directions **-** Attempt to identify odors present at viewing location(s). This may require becoming familiar with the sometimes unpleasant natural odors of wetlands.

Rationale – Unnatural odors are assumed to reduce the aesthetic quality of wetlands.

V.5.5 Question 5 – *Approximate extent of open water visible from primary viewing location(s).*

Directions **-** Mark the approximate area of visible open water on the wetland base map and determine the area using the dot grid method or planimeter.

Rationale – Views of open water are generally considered to be aesthetically appealing.

V.5.6 Question 6 – *General appearance of the wetland and surrounding land use(s) visible from primary viewing location(s).*

Directions - Judge the visual quality of the wetland and surrounding area based on the criteria provided.

Rationale – The aesthetic quality of wetlands lies in the natural beauty of their lush vegetation. Trash and other signs of disturbance detract from this beauty.

V.5.7 Question 7 – *Landform contrast.*

Directions - Determine whether the wetland provides a visual contrast with the surrounding landscape.

Rationale – Wetlands, which are generally low-lying, often contrast dramatically with the surrounding areas, for example, a marsh adjacent to a ridge or cliff. On the other hand, some floodplain wetlands may provide little visual contrast.

V.5.8 Question 8 – *Dominant surrounding land use visible from primary viewing location(s).*

Directions - This question requires a judgment as to the dominant land use visible at the primary viewing location(s). In most cases, this will be obvious (i.e. the wetland is viewed from a residential area or urban area, etc.).

Rationale – The N.H. Method assumes that the most appealing views of wetlands are from other areas of natural beauty such as upland forest. Wetlands occurring in an urban setting, which may score low here, are accounted for in Functional Value 13.

V.5.9 Question 9 – *Area of wetland dominated by flowering trees or shrubs, or trees or shrubs which turn vibrant colors in the fall.*

Directions - Determine the area of the wetland (in acres) dominated by plants meeting the above criteria. The identification of common plants in your area which meet these criteria should be relatively easy using readily available plant field guides.

Rationale – Plant species, such as red maple which turns a brilliant red in the fall, and blue flag which produces flowers, add greatly to the visual appeal of wetland at certain times of the year.

V.5.10 Question 10 – *Wetland wildlife habitat.*

Directions - Record the Average FVI from Functional Value 2.

Rationale – Vistas that include wetland wildlife enhance the aesthetic quality of a wetland.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 5

VISUAL/AESTHETIC QUALITY

- USGS topographic map
- Land use map or recent aerial photograph
- Ruler or scale
- Method to measure area (Dot grid or planimeter)
- Ability to make an on-site assessment of the best, most useable viewing area(s)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD:			
1. Number of wetland classes visible from primary viewing location(s).		a. Three or more classes	1.0
		b. Two classes	0.5
		c. One class	0.1
2. Dominant wetland class visible from primary viewing location(s).		a. Low growing wetlands such as marshes, bogs, and open water, or scrub-shrub having vegetation <3ft. in height	1.0
		b. Wet meadow	0.5
		c. Forested, scrub-shrub	0.1
3. Noise level at primary viewing location(s).		a. Low: Birds, wildlife and other naturally occurring sounds predominate	1.0
		b. Moderate: Some traffic or other noise audible	0.5
		c. Loud: Continuous traffic, factories, or similar noise	0.1
4. Odors present at primary viewing location(s).		a. Natural odors only (Note: some natural odors may be unpleasant)	1.0
		b. Unnatural odors present at certain times such as auto exhaust or a sewage treatment plant	0.5
		c. Unnatural odors distinct, more or less continuous and noticeably unpleasant	0.1
5. Approximate extent of open water visible from primary viewing location(s).		a. More than 3 acres of open water, or more than 300 feet of a stream	1.0
		b. From 1 to 3 acres of open water, or 100-300 feet of a stream	0.5
		c. Less than 1 acre of open water, or less than 100 feet of a stream	0.1
6. General appearance of the wetland and surrounding land use(s) visible from primary viewing location(s).		a. Undisturbed and natural. No visual detractors present such as litter, abandoned cars, etc. or if such are present, then can be easily corrected.	1.0
		b. Limited disturbance in and/or around wetland. Minor visual detractors present and difficult to correct	0.5
		c. Severe detractors present and difficult to correct	0.1

Wetland Name/Code:________________________________

Functional Value 5

VISUAL/AESTHETIC QUALITY

(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Function al Value Index (FVI)
QUESTIONS TO ANSWER IN FIELD (continued)			
7. Landform contrast.		a. Wetland provides dramatic visual contrast with surrounding topography	1.0
		b. Wetland provides some visual contrast with surrounding topography	0.5
		c. Wetland provides little or no visual contrast with surrounding topography	0.1
8. Dominant surrounding land use visible from primary viewing location(s).		a. Woodland, agricultural land, and/or well-landscaped residential or commercial areas	1.0
		b. Other residential and commercial areas of ordinary visual quality.	0.5
		c. Urban and built up areas of low visual quality	0.1
9. Area of wetland dominated by flowering trees and shrubs, **OR** trees or shrubs which turn vibrant colors in the fall.		a. More than 5 acres	1.0
		b. From 1 to 5 acres	0.5
		c. Less than 1 acre	0.1
10. Wetland wildlife habitat.		Average FVI from Functional Value 2	_______

AVERAGE FVI FOR FUNCTIONAL VALUE 5 = Average of column D= _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 5 = Total area of wetland visible* from primary viewing location(s) = ________________ acres.

*visible – You may need to measure this area from the wetland base map as it may only be a percentage of the actual wetland size.

V.6 FUNCTIONAL VALUE 6 – WATER-BASED RECREATION (CANOEING, NON-POWERED BOATING, FISHING, HUNTING AND WILDLIFE OBSERVATION)

Many recreational activities take place in and around wetlands. For example, hunting and fishing are popular sports in wetlands. Wetlands associated with open water bodies also support recreational activities such as boating. Many people simply enjoy the beauty and sounds of nature and spend their leisure time walking in or near wetlands, observing plant and animal life.

This evaluation stresses non-powered boating which is considered to be less disruptive to the wetland environment than powered boating.

QUESTIONS TO ANSWER IN THE OFFICE:

V.6.1 Question 1 – *Fishing.*

Directions - This question can be answered by consulting the stocking report published by the New Hampshire Fish and Game Department or by local inquiry.

Rationale – Fishing is one of the most popular forms of outdoor recreation.

V.6.2 Question 2 – *Hunting.*

Directions - Determine if the wetland being evaluated is in an area where hunting is permitted.

Rationale – Hunting is a popular sport in New Hampshire. It is assumed that although there will be huntable species in most wetlands, some areas of New Hampshire may be closed to hunting. You may need to make enquiries locally to determine which areas are closed to hunting.

V.6.3 Question 6 – *Opportunities for wildlife observation.*

Directions - Record the Average FVI from Functional Value 2.

Rationale – Non-consumptive wildlife-related recreation which includes wildlife observation, photography, etc. is the most popular form of wildlife-related recreation.

QUESTIONS TO ANSWER IN THE FIELD:

V.6.4 Question 4 – *Water quality of the watercourse, pond or lake associated with the wetland.*

Directions - As for Question V.1.3.

Rationale – Poor water quality can make canoeing unpleasant because of odors, etc., and may also present a health problem for the recreationist.

V.6.5 Question 5 – *Canoe and boat passage (average annual accessibility).*

Directions – Determine the suitability of lakes or streams within or adjacent to wetlands for canoeing or non-powered boating. In some cases, water levels may only be adequate during spring high water.

Rationale – Many wetlands occur along canoeable streams or lakes. This provides important recreational opportunities. In addition, a canoe route can provide an important viewpoint for enjoying the aesthetic beauty of a wetland. This question focuses on non-powered boats which are less disruptive than powered boats.

V.6.6 Question 6 – *Off-road public parking at potential recreation site.*

Directions **-** Examine the area within 150 feet of the water's edge. Adequate parking requires an open area with a firm soil or gravel base. For safety, the parking area should be located on the same side of the road as the wetland and should have an unobstructed view of oncoming traffic at the point of entrance and exit.

Rationale – Parking near the water's edge is necessary to allow the unloading of boats and equipment.

V.6.7 Question 7 – *Access to water at potential recreation site for canoeing or fishing.*

Directions **-** Determine if there is direct access to water at the potential recreation area. Good access would require a trail over firm ground to the water's edge. A potential access would exist if there were only a short distance of wet ground or ditch that required a simple bridge or elevated path.

Rationale – Direct access to water is necessary for launching canoes and boats.

V.6.8 Question 8 – *Visual/Aesthetic quality of potential recreation site.*

Directions **-** Record the average FVI from Functional Value 5.

Rationale – Aesthetically pleasing surroundings enhance an outdoor recreational experience. This is particularly true for such activities as canoeing and wildlife observation.

Wetland Name/Code:_______________________________

NEEDED FOR THIS EVALUATION

- N.H. Water Quality Report to Congress 305(b)
- Fish stocking information
- Anadromous Fish Run information
- Familiarization with watercourse through the seasons
- USGS topographic map, aerial photographs or other means (including a field walk), to assess the length of canoeable stream

Functional Value 6

WATER-BASED RECREATION IN WATERCOURSE ASSOCIATED WITH THE WETLAND

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
Note: If no year round stream, pond or lake is present, enter zero for this Functional Value and proceed to next Functional Value			
Evaluation area(s) ________________________			
QUESTIONS TO ANSWER IN THE OFFICE:			
1 Fishing.		a. Wetland located on state stocked and/or frequently fished stream or lake	1.0
		b. Wetland located on stream or lake which is used occasionally for fishing	0.5
		c. Wetland located on stream or lake which is seldom used for fishing because of poor water quality, lack of access, insufficient depth, etc.	0.1
2 Hunting.		a. Wetland is in an area where hunting is permitted	1.0
		b. Wetland is in an area where hunting is prohibited	0.1
3 Opportunities for wildlife observation.		Average FVI for Functional Value 2	_______
QUESTIONS TO ANSWER IN THE FIELD:			
4 Water quality of watercourse, pond or lake associated with wetland. (Previously determined in V.1.3).		FVI from Question V.1.3	_______
5 Canoe and boat passage (average annual accessibility)		a. Watercourse is at least 10 feet wide and one foot deep and is free of obstructions for canoeing and/or nonpowered boating	1.0
		b. Watercourse contains some year-round and/or seasonally exposed obstructions and/or shallow area which hinder the use of canoes or nonpowered boats	0.5
		c. Watercourse is too small and shallow and/or contains obstructions which prohibit the use of canoes and/or nonpowered boats	0.1

Wetland Name/Code:________________________________

Functional Value 6
WATER-BASED RECREATION IN WATERCOURSE ASSOCIATED WITH THE WETLAND
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Function al Value Index (FVI)
QUESTIONS TO ANSWER IN FIELD			
6 Off-road public parking at potential recreation site.		a. Wetland within walking distance, or a suitable parking are is in close proximity to the recreational site	1.0
		b. Moderate expense required to develop parking area within close proximity to the recreational site	0.5
		c. Parking within close proximity of the recreational site not available, or expensive to develop because of traffic flow, soil suitability, or other problems	0.1
7 Access to water at potential recreation site for canoeing or fishing (good site to launch a boat or stand to cast and fish).		a. Direct access to water available or easily developed	1.0
		b. Direct access to water would require moderate expense to develop	0.5
		c. Direct access would require major expense to develop	0.1
8 Visual/aesthetic quality of potential recreational site.		Average FVI from Functional Value 5	_______

AVERAGE FVI FOR FUNCTIONAL VALUE 6 = Average of column D= _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 6 = Area of wetland evaluated for
Water-based recreation* = ________________ acres.

* This may be all or part of the wetland. Birding, hunting, fieldwalks may use entire wetland.

V.7 FUNCTIONAL VALUE 7 – FLOOD CONTROL POTENTIAL

Wetlands are natural storage areas which can act as buffers to reduce downstream flood peaks. As with the other Functional Values of wetlands, the intention of Functional Value 7 is to derive an index which will allow for the comparison of the relative flood control potential of all the wetlands within a study area.

Freshwater wetland act as natural flood regulators by temporarily storing floodwaters, and then slowly releasing the stored waters downstream. During heavy rainstorms, the water entering the wetland from rainfall, surface runoff and stream-flow is slowed down by shrubs, trees, reeds, rushes, and other wetland plants. This reduces the amount of water in the downstream river system at the peak of the flood, and ensures that floodwaters from tributaries do not reach the main river at the same time. In this way, wetlands help protect adjacent and downstream areas from flood damage. The loss of wetlands in the floodplain can thus significantly increase downstream flooding and damage.

The method for calculating the wetland Flood Control index is intended to give a "first cut" assessment. For those wetlands which appear to have a high potential for flood control, more detailed field measurements and calculations may be needed.

Hydrological basis for an Index of Flood Control Potential

Two main factors influence the effectiveness of a wetland in reducing downstream flood peaks: (a) how much storage potential there is in the wetland, and (b) how slowly the wetland will release the stored water. (This is related to size and shape of the wetland outlet (discussed below)).

The simplest way to assess storage potential is to compare the size of the wetland with the watershed area which could contribute water from snowmelt or heavy rainstorms. Generally, a large wetland with a small contributing watershed will be more effective for flood control than a small wetland with a large watershed.

The rate at which a wetland releases stored water is related to the size and shape of the outlet. Wetlands with more restrictive (narrow) outlets are most effective in retarding flow. This is because a narrow outlet will release water more slowly than a wide outlet.

Simple measurements of the geometry of the wetland outlet, when compared with the wetland and watershed areas, can give an indication of the wetland's effectiveness in releasing or retarding flood waters.

By combining calculations of area and measurements of flow restriction it is possible to read from a table an index of value for wetland flood control potential (See table given on the evaluation data sheet, page ???). This index, with values from 0.0 to 1.0, describes the potential of the wetland for providing flood control. That is, in this evaluation the flood control potential of a wetland is a function or the relationship between the wetland area-to-watershed area ratio, and the size of the restrictive feature (such as a beaver dam) at the outlet. For example, a wetland with a small contributing watershed but a wide outlet with little restriction will score lower than the same wetland with a narrow, restricted outlet. To ensure consistency between wetlands, it is recommended that the measurements be taken during the same season of the year.

Three measurements are required to do the calculations required for this evaluation. Two of these can be made in the office using topographic maps and/or aerial photographs, but the third requires careful measurement in the field.

QUESTIONS TO ANSWER IN THE OFFICE:

V.7.1 Question 1 – ***Determine the area of the wetland in acres.***

<u>Directions</u> **-** Use the wetland area calculated in Question V.1.1, Functional Value 1.

<u>Rationale</u> – Generally, the larger the wetland is in relation to its watershed, the greater its opportunity to store flood water.

V.7.2 Question 2 – ***Determine the area of the watershed above the outlet of the wetland in acres.***

<u>Directions</u> **-** Determine the area of the watershed draining into the wetland. Directions for doing this are given in Appendix E.

Rationale – The effective storage area of a wetland in relation to the drainage area (watershed) is the single most important factor in flood control. As the amount of flood water stored in a wetland increases, immediate flood runoff is decreased, and is then released slowly over a longer period of time.

QUESTIONS TO ANSWER IN THE FIELD:

V.7.3 Question 3 – *Determine the Wetland Control Length (WCL)*

Directions **-** The measurement needed is the Wetland Control Length (WCL), which is defined technically as the length (measured in feet) of the crest of the restrictive feature that would be overtopped if the water level in the wetland was raised by one foot. Most restrictive features are perpendicular to the direction of flow (Figure V.7.1). The greater the WCL (i.e. the less restricted the outlet) the less the wetland's effectiveness in restricting the outflow of flood water. The best way to measure the WCL will depend on the kind of restrictive feature which is at the outlet of the wetland. Suggestions are listed below for measuring each of the types of restrictive features which commonly occur in New Hampshire.

Note: In cases where there is an area of wetland adjacent to a lake, the WCL will be determined by the lake exit restrictive feature. The water area of the lake should be included in the wetland area calculation.

Beaver dams
A well maintained active beaver dam is probably one of the easiest restrictive features to measure. By standing as close as possible to the beaver dam, visualize the water level rising one foot above its present level (Figure V.7.2). By pacing, or using a tape of a rope (to be measured afterwards), measure the length of dam which would be overtopped by a rise of one foot in water level. For active beaver dams this is likely to be the whole dam length; for dams in disrepair, only parts of the dam may be overtopped by a one foot rise (in this case, add together the lengths of separate segments which would be overtopped).

Concrete structures
At the time of measurement, water may be flowing over the crest of such structures, or water from the wetland may be moving around and below the structure because of leaks and seepage. The measurement principle remains the same as for beaver dams (Figure V.7.2). Be careful to note whether or not the one foot rise of water would overtop areas wider than the concrete spillway.

Some dams will have sluice gates, (usually bottom discharging), or gate slots for raising and lowering water levels. The one foot rise principle still applies in both situations for determining the WCL. Your calculation should be based on the situation on the day of measurement.

Culverts, roadways and embankments
For many wetlands small culverts under roads will be the most obvious restrictive feature. In such cases the WCL is likely to be very small (restricted to the diameter of the pipe(s) which carry flow). It is important to check whether there are other pipes (culverts) which would take flow in the event of a one foot rise. In the case of farm or forest roads it is possible that the one foot rise would overtop parts of the roadway. Careful vertical measurement is needed in such cases, because of the great increase in the WCL that results when the flood flow is estimated to occur beyond the culvert width (Figure V.7.3).

In some instances where there is adequate natural subsurface drainage, there may be causeways and artificial banks which are the effective down-gradient outlet for the wetland, but which do not have culverts or water flowing in a defined channel. In such cases the one foot rule should be applied with particular care taken in vertical measurements or estimation.

Natural geological restrictions
This type of restrictive feature is one of the most difficult to measure. The important first step is to define the exact point of the wetland outlet, usually where a stream is flowing in a defined channel. At the chosen location, the one foot rule should be applied to the cross section of the stream, the WCL being the horizontal extent of flow (e.g. bank to bank) that would occur with a one foot rise of water level.

Wetlands with no obvious restrictive features
There are wetlands which merge very gradually with adjacent down-gradient drier areas. In most cases their flood inhibiting properties will be limited. The WCL of such wetlands may be difficult to define and is likely to be large.

Rationale – The effective storage of a wetland (mentioned in Question V.7.2 above) is a function of the surface area of the wetland and the depth of flood flow within the wetland. **For a given area the more restrictive the outlet of the flow leaving the wetland, the more effective the wetland becomes as a flood water retarding device.**

V.7.4 and V.7.5 Questions 4 and 5 – *Calculate the FVI for Flood Control Potential.*

Directions **–** Follow the instructions given on the data sheet for calculating the FVI.

Rationale – The table of FVI's for Flood Control Potential is based upon numerous TR-20 computer runs for small ponds (including beaver ponds) and wetlands in New Hampshire.

V.7.6 Question 6 – *Describe the wetland outlet restriction.*

Directions **–** Using the following categories of restrictive features, provide a sketch of the restrictive feature marking clearly the extent of the Wetland Control Length (WCL).

Beaver dam
Concrete structure
Culvert, roadways and embankments
Natural geological constrictions
No obvious restrictive features
Other

Rationale – As well as helping the user to visualize and understand the procedures in this calculation, the sketch will provide a record of how you went about your calculation. This information may be useful in subsequent studies conducted on the wetland in question.

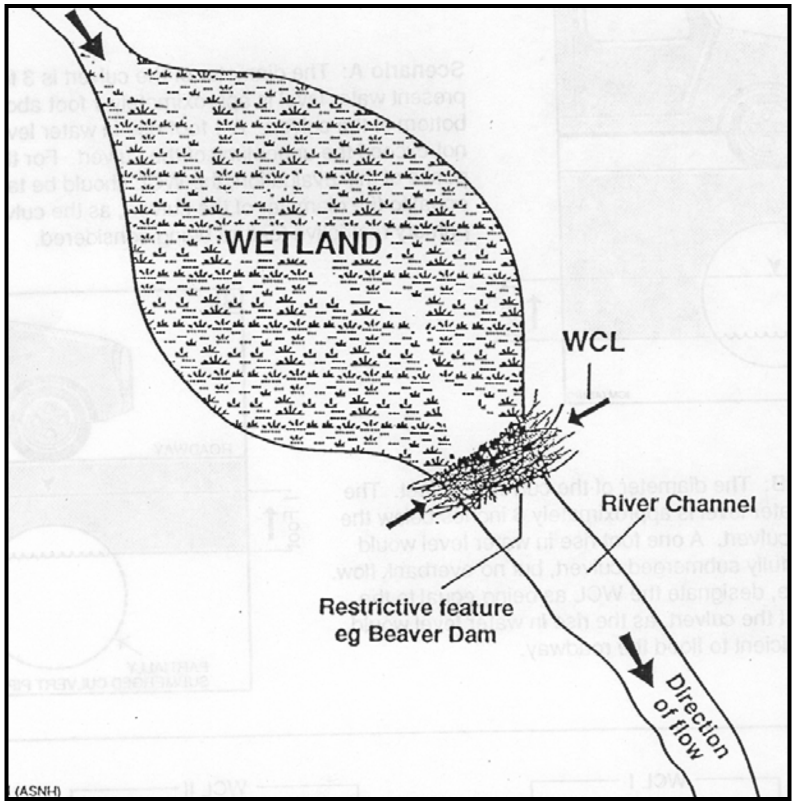


Figure V.7.1: Location of the Restrictive Feature.

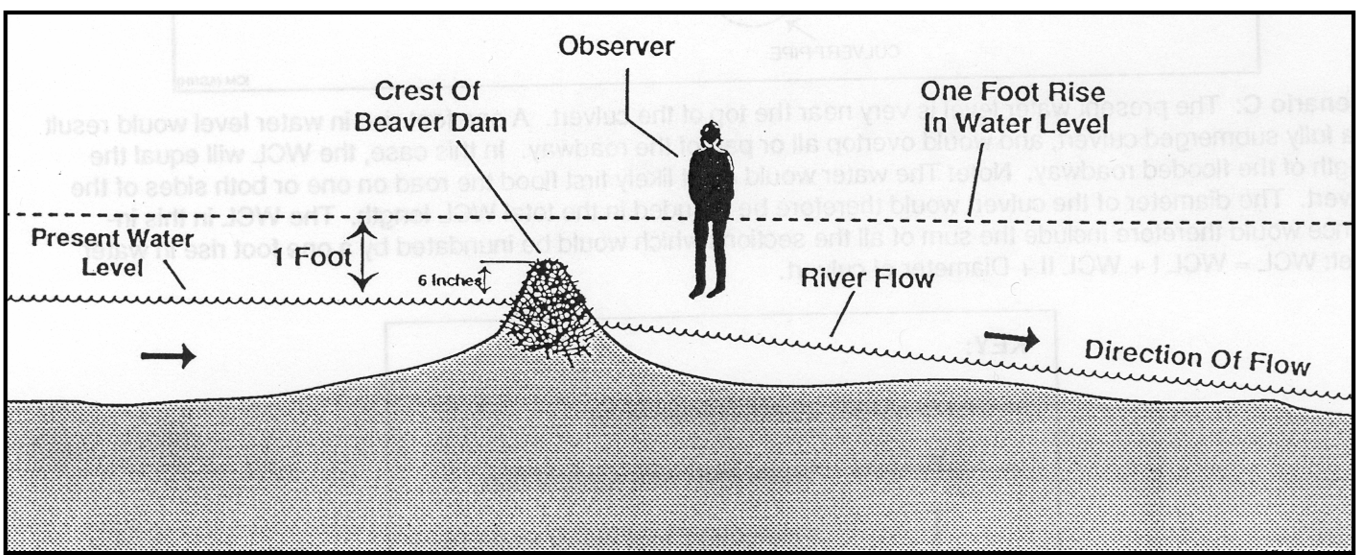
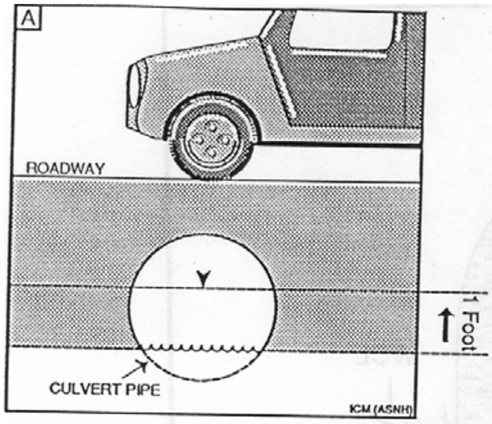


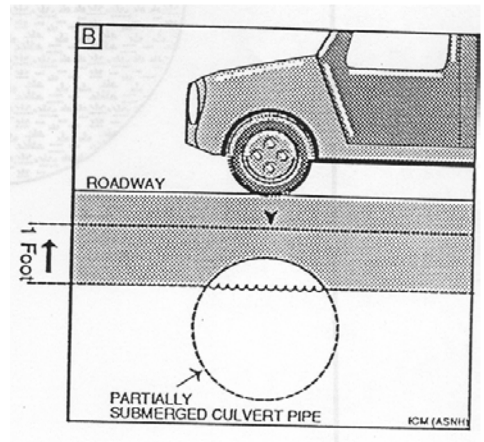
Figure V.7.2: Restrictive Feature: Beaver Dam.

The crest of the beaver dam is 6 inches above existing water level.

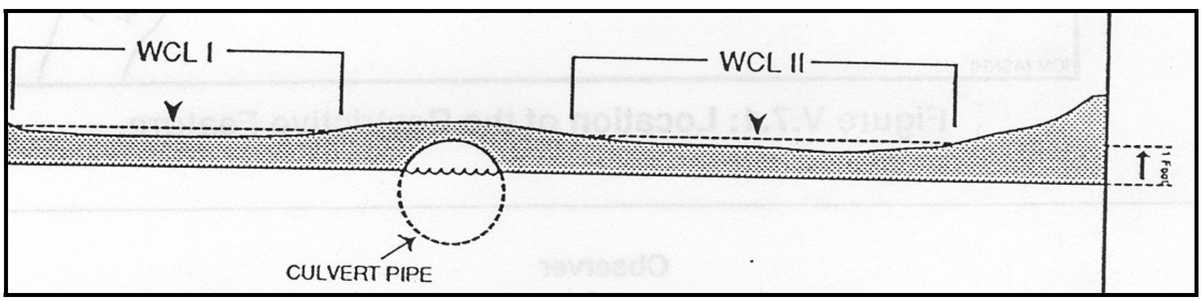
A one foot rise in water level would result in the dam being overtopped.



Scenario A: The diameter of the culvert is 3 feet. The present water level is approximately one foot above the bottom of the culvert. A one foot rise in water level would not exceed the upper limit of the culvert. For the purposes of this evaluation, the WCL should be taken to be equal to the diameter of the culvert, as the culvert is the primary restrictive feature being considered.



Scenario B: The diameter of the culvert is 3 feet. The present water level is approximately 6 inches below the top of the culvert. A one foot rise in water level would result in a fully submerged culvert, but no overbank flow. In this case, designate the WCL as being equal to the diameter of the culvert, as the rise in water level would not be sufficient to flood the roadway.



Scenario C: The present water level is very near the top of the culvert. A one foot rise in water level would result in a fully submerged culvert, and would overtop all or part of the roadway. In this case, the WCL will equal the length of the flooded roadway. Note: The water would most likely first flood the road on one or both sides of the culvert. The diameter of the culvert would therefore be included in the total WCL length. The WCL in this instance would therefore include the sum of all the sections which would be inundated by a one foot rise in water level: WCL=WCLI + WCLII +Diameter of culvert.

KEY:

˘˘˘˘˘˘˘˘˘˘˘˘˘˘˘˘	Existing water level
____▼____	Water level with a 1 ft. rise
↑	Estimated 1 ft. rise of water level

Figure V.7.3: Restrictive Feature: Culvert, Roadway, or Embankment.

Where the restrictive feature is a culvert under a road, three possible scenarios (A, B, & C) could present themselves

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 7

FLOOD CONTROL POTENTIAL

- A method to calculate area (Dot grid, planimeter, etc.)
- USGS topographic map and recent aerial photographs
- Ability to delineate a watershed (see Appendix E)
- Ability to understand elevations on a topographic map or site plan
- Tape measure or rope for measuring distance

TO BE COMPLETED IN THE OFFICE:

1. Determine the area of the wetland in acres (WA). __________ acres. e.g. 2 acres

2. Determine the area of the watershed above the outlet of the wetland in acres (DA). __________ acres e.g. 50 acres

3. Determine the Wetland Control Length (WCL) in feet. _________ feet. e.g. 6 feet

4. Calculate the FVI for Flood Control Potential:

Step 1 Ratio A = $\frac{\text{Area of watershed above outlet of wetland (DA)}}{\text{Area of Wetland (WA)}}$ = _________________.

e.g. $\frac{50}{2} = 25$

Step 2 Ratio B = $\frac{\text{Area of watershed above outlet of wetland (DA)}}{\text{Wetland Control Length (WCL)}}$ = _________________.

e.g. $\frac{50}{6} = 8$

5. Read horizontally to the right from the appropriate Ration B value to the column heading that most closely approximates the computed Ratio A value. Your answer, found at this intersection, is the FVI for this Functional Value. Following the example given above, where Ration B = 8.0 and Ration A = 25. the FVI would be 0.5.

Ratio B = $\frac{DA}{WCL}$	Ratio A = $\frac{DA}{WA}$				
	Ratio A < 10 FVI	10<Ratio A<20 FVI	20<Ratio A<50 FVI	50<Ratio A<100 FVI	Ratio A> 100
0.1	0.0	0.0	0.0	0.0	0.0
0.2	0.1	0.0	0.0	0.0	0.0
0.4	0.3	0.0	0.0	0.0	0.0
0.8	0.5	0.3	0.0	0.0	0.0
1.0	0.6	0.3	0.0	0.0	0.0
2.0	0.8	0.5	0.1	0.0	0.0
4.0	1.0	0.7	0.3	0.1	0.0
8.0	1.0	0.9	0.5	0.2	0.0
16.0	1.0	1.0	0.7	0.3	0.1
32.0	1.0	1.0	0.9	0.6	0.2
64.0	1.0	1.0	1.0	0.8	0.4
128.0	1.0	1.0	1.0	0.9	0.7
256.0	1.0	1.0	1.0	1.0	1.0

Note: FVI values of zero indicate the wetland has the potential to reduce a flood flow by 10% or less. FVI values of 1.0 indicate the wetland has the potential to reduce flood flows by 80% or more. Intermediate FVI values are interpolated between there two extremes.

AVERAGE FVI FOR FUNCTIONAL VALUE 7 (from table) = _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 7 = Area of wetland = ________________ acres.

	A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
9	Sketch of wetland outlet restriction			

V.8 FUNCTIONAL VALUE 8 – GROUND WATER USE POTENTIAL

Note: Evaluate this Function only if the wetland is upstream of a stratified drift aquifer or if the wetland is overlying all or part of a stratified drift aquifer. If these requirements are not satisfied, then proceed to Functional Value 9.

Sources of potable water are obviously important to most communities, particularly in the more heavily populated area. Wetlands are most frequently ground water discharge areas. Ground water discharges into many depressional wetlands or into sloping wetlands in "spring seepage" areas. In certain instances, however, some wetlands may play an important role in recharging ground water aquifers. Stratified drift aquifers are generally assumed to have a high potential to yield water.

QUESTIONS TO ANSWER IN THE OFFICE:

V.8.1 Question 1 – *Existing public or private water supply wells.*

Directions **-** Refer to DES Ground Water Availability Maps (Reconnaissance maps, early 1970's, scale 1:125,000), DES Stratified Drift Aquifer Reports (1:24,000) (when available) or DES Well Inventory and Water User Maps to determine if there are producing wells in a stratified drift aquifer downstream of the wetland which are part of a public or private water supply system. Sources of this information include town officials and N.H. DES.

Rationale – Wetlands tend to have a purifying effect on water discharged downstream.

V.8.2 Question 2 – *Potential public or private water supply.*

Directions **-** Refer to Ground Water Availability (Reconnaissance) Maps (or town aquifer maps if available), or Stratified Drift Aquifer Reports. Determine whether the wetland is located on or upstream of a stratified drift aquifer.

Rationale – Unconsolidated aquifers are the highest yielding aquifer type in New Hampshire. They have the potential to produce the high yielding wells which are very important for public water supply.

V.8.3 Question 3 – *Ground water quality of the stratified drift aquifer.*

Directions **-** Determine the quality of ground water in the stratified drift aquifer from actual test data if available. Alternatively, refer to the New Hampshire Water Quality Report to Congress 305 (b) for information on ground water quality. If data are not available, leave this question out of the evaluation.

Rationale – High quality waters that meet DES drinking water standards may be used for public water supply. Moderate expenditures may be required to treat lower quality waters that do not meet these standards to render them suitable for drinking water purposes.

QUESTIONS TO ANSWER IN THE FIELD:

V.8.4 Question 4 –*Water quality of watercourse, pond or lake associated with wetland.*

Directions **-** As for Question V.1.3.

Rationale – Class A waters may be used as a public water supply. Moderate expenditures may be required to treat Class B waters to render them suitable for drinking water. Class C waters are suitable for receiving treated wastes and discharges and are not suitable for drinking water purposes.

Wetland Name/Code:______________________________

NEEDED FOR THIS EVALUATION

Functional Value 8

GROUND WATER USE POTENTIAL

- N.H. Water Quality Report to Congress 305(b)
- DES Well Inventory and Water User maps
- DES Ground Water Availability maps (Reconnaissance Maps) (early 1970's)
- DES Stratified Drift Aquifer Maps (when available)
- Surficial Geology maps
- NRCS soils maps

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
Note: Evaluate this Function <u>only</u> if the wetland is upstream of, or overlying an aquifer. Other-wise, proceed to Functional Value 9			
QUESTIONS TO ANSWER IN THE OFFICE: (some field verification may be necessary)			
1 Existing public or private water supply wells.		a. Public or private water supply well(s) located <0.5 miles downstream of wetland	1.0
		b. Public or private water supply well(s) located 0.5 to 1 mile downstream of wetland	0.5
		c. No public or private water supply well(s) within 1 mile downstream of wetland	0.1
2 Potential public or private water supply.		a. Stratified drift aquifer located <0.5 miles downstream of wetland	1.0
		b. Stratified drift aquifer located 0.5 to 1 mile downstream of wetland	0.5
		c. No stratified drift aquifer within 1 mile downstream of wetland	0.1
3 Ground water quality of the stratified drift aquifer.		a. Meets NH DES drinking water quality standards	1.0
		b. Requires treatment to meet drinking water standards	0.5
		c. Classified as saline or otherwise unsuitable for drinking water	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
4 Water quality of watercourse, pond or lake associated with wetland.		FVI from Question V.1.3	_______

AVERAGE FVI FOR FUNCTIONAL VALUE 8 = Average of column D= _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 8 = Total area of wetland = ________________ acres.

V.9 FUNCTIONAL VALUE 9 – SEDIMENT TRAPPING

During periods of heavy rainfall, runoff may cause erosion and increase the particulate matter in surface water. Excess sediment entering river and lake systems from storm water runoff can cause damage to the aquatic ecosystem. Sediment accumulates in the stream bottom smothering gravel spawning areas and killing aquatic insect larvae. Sediment can also reduce the capacity of downstream water supply reservoirs.

As water flows through wetlands, it is slowed by plants and much of the sediment load settles to the bottom before the water moves further on downstream. As much as 80-90% of the sediments in the water may be removed as they move through wetlands, resulting in cleaner water entering lakes, rivers and streams.

This evaluation is divided into two parts. Part A evaluates the opportunity for the wetland to trap sediment given the current land use in the watershed above it. Part B evaluates the overall potential for sediment trapping by the wetland (considered both opportunity and the wetland's potential trap efficiency). The average FVI from Part A is used in Part B to calculate the overall FVI for sediment trapping of the wetland.

PART A: OPPORTUNITY FOR SEDIMENT TRAPPING

QUESTION TO ANSWER IN THE OFFICE:

V.9.1A (Part A) Question 1 – *Average slop of watershed above wetland.*

Directions **-** Use a topographic map to estimate the average slope of the watershed. An example of how to calculate average slope is given in Appendix F.

Rationale – A watershed with steep slopes (greater than 8%) is more prone to rapid stormwater runoff and erosion and therefore has a higher potential as a source of sediment.

QUESTION TO ANSWER IN THE FIELD:

V.9.2A (Part A) Question 2 – *Potential sources of excess sediment in the watershed above the wetland.*

Directions **-** Determine whether there are potential sources of sediment into the watershed. Such areas include active cropland, construction sites, eroding road banks, ditches, streambanks, and similar areas with little or no vegetation to protect soils from erosion.

Rationale – Area lacking vegetation often export sediment into the aquatic ecosystem. These areas can be treated by conservation, erosion, and sediment control measures, but the N.H. Method assumes that in many cases this is not done.

PART B: OVERALL POTENTIAL FOR SEDIMENT TRAPPING BY THE WETLAND

QUESTIONS TO ANSWER IN THE OFFICE:

V.9.1B (Part B) Question 1 – *Opportunity for sediment trapping.*

Directions **-** Record the Average FVI from Part A of this Functional Value.

Rationale – To have the highest value for sediment trapping there must be both a high trap efficiency and an opportunity for sediment trapping.

V.9.2B (Part B) Question 2 – *Effective floodwater storage of wetland.*

Directions **-** Record the FVI from Functional Value 7.

Rationale – Standing water acts as a sediment trap because it greatly slows the flow of the incoming stream water. Sediment tends to settle out as the velocity of the incoming water slows down. During periods of high flow, streams usually carry higher levels of sediment than normal, so wetlands which can temporarily impound flood flows are particularly effective in reducing sediment loads.

QUESTIONS TO ANSWER IN THE FIELD:

V.9.3B (Part B) Question 3 – ***Wetland location in relation to an intermittent or perennial stream, or a lake.***

Directions - Determine whether or not the wetland forms a buffer along an intermittent or perennial stream, or a lake. Measure the width of the buffer perpendicular to the shoreline of a stream or lake (Figure V.9.1).

Rationale – Wetlands bordering a perennial or intermittent stream or lake act as a buffer strip between uplands and the aquatic ecosystem. This wetland buffer acts to trap sediments transported from upland areas, reducing the sediment load of the waters entering the watercourse, pond, or lake.

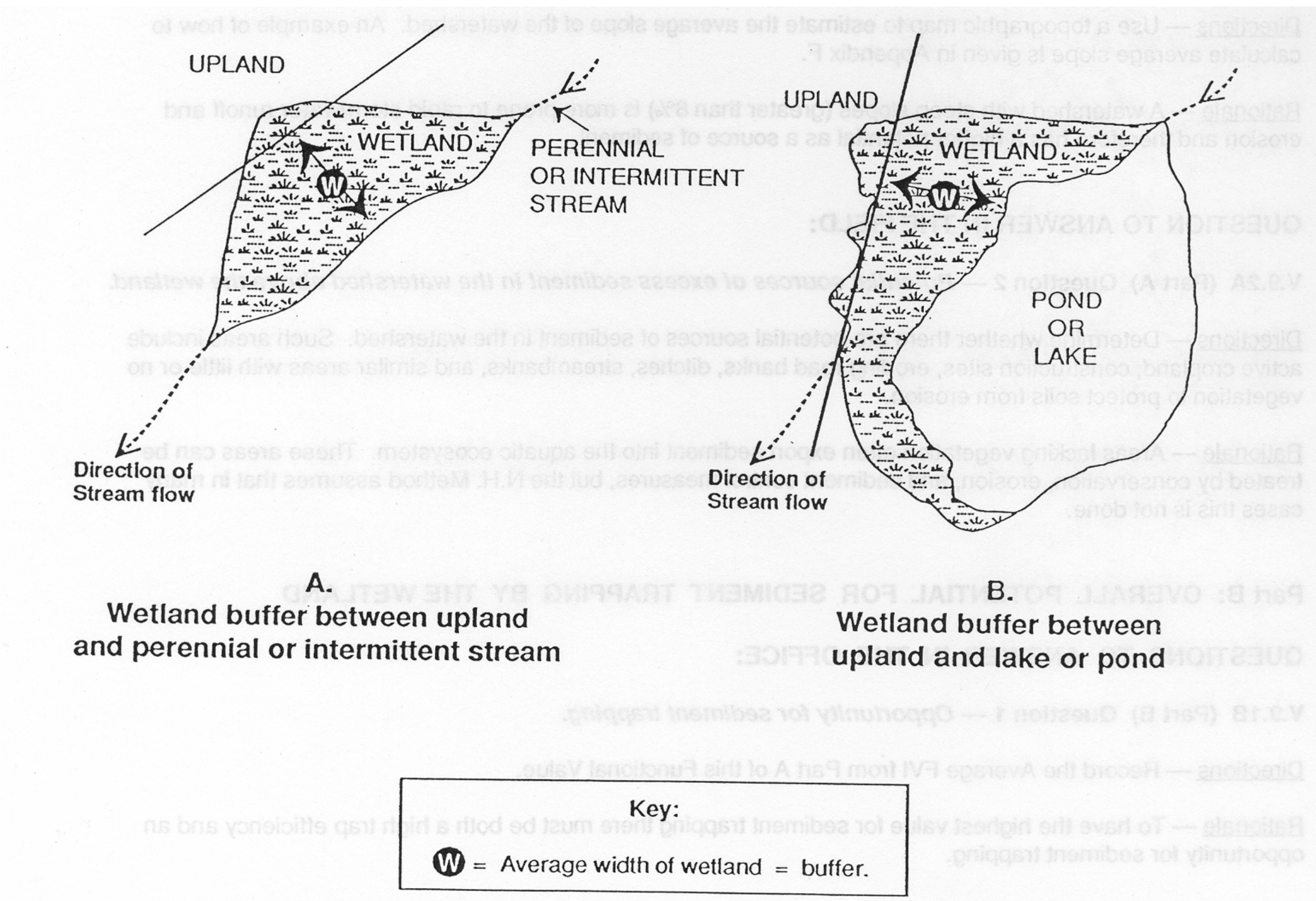


Figure V.9.1: Wetland location in relation to A: a stream, and B: a lake.

V.9.4B (Part B) Question 4 – ***Dominant wetland class bordering a stream or lake.***

Directions **-** Determine the dominant wetland class bordering the watercourse.

Rationale – Sediment trapping occurs to a large extent during periods of high flow. As the watercourse overtops the stream bank during such high flow periods, it is slowed by shoreline vegetation, causing deposition of sediment. Stands of very dense vegetation, such as scrub/shrub wetlands and dense stands of cattails and emergents provide the most resistance to storm flows, slowing down the water and allowing greater deposition of sediments to occur.

V.9.5B (Part B) Question 5 – ***Areas of impounded open water.***

Directions **-** Determine if there is permanent standing water in the wetland. Standing water may be the result of a dam (including a beaver dam), a road, or because the wetland is in a depression.

Rationale – Standing water acts as a sediment trap because it greatly slows the flow of the incoming stream. Sediment tends to settle out as the velocity of the incoming water slows down.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 9

SEDIMENT TRAPPING

- USGS topographic map
- Land use map or recent aerial photographs
- A method to calculate area (Dot grid, Planimeter, etc.)
- Knowledge or familiarity with the extent and type of current development in the study area
- Ability to calculate average slope (See Appendix F)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A – Opportunity for Sediment Trapping			
QUESTIONS TO ANSWER IN THE OFFICE:			
1 Average slope of watershed above wetland.		a. Steep: Greater than 8%	1.0
		b. Moderate: From 3 to 8%	0.5
		c. Low: Less than 3%	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
2 Potential sources of excess sediment in the watershed above the wetland.		a. Extensive areas of active cropland, construction sites, eroding road banks, ditches, and similar areas	1.0
		b. Some areas of active cropland, a few construction sites, and similar areas	0.5
		c. Land use in watershed predominantly forested, abandoned farmland or otherwise undeveloped	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 9, PART A = Average of column D for Part A = _____________.

PART B – Overall Potential for Sediment Trapping by Wetland			
QUESTIONS TO ANSWER IN THE OFFICE:			
1 Opportunity for sediment trapping.		Average FVI from Part A above	________
2 Effective floodwater storage of wetland.		FVI from Functional Value 7	________
QUESTIONS TO ANSWER IN THE FIELD:			
3 Wetland location in relation to an intermittent or perennial stream or lake.		a. Wetland forms a buffer more than 50 ft. wide between upland and stream or lake	1.0
		b. Wetland forms a buffer from 20 to 50 ft. wide between upland and stream or lake.	0.5
		c. Wetland forms a buffer less than 20 ft. wide, or wetland not bordering a stream or lake.	0.1

Wetland Name/Code:________________________________

Functional Value 9
SEDIMENT TRAPPING
(continued)

	A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
4	Dominant wetland class bordering a stream or lake.		a. Scrub-shrub or dense stands of cattails or phragmites	1.0
			b. Forested	0.5
			c. Other types, or wetland does not border a stream or lake	0.1
5	Areas of impounded open water (including beaver dams).		a. Wetland contains permanently impounded open water greater than 5 acres in size	1.0
			b. Wetland contains permanently impounded open water from 0.5 to 5 acres in size	0.5
			c. Wetland contains permanently impounded open water less than 0.5 acres in size, or does not contain open water	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 9, PART B = Average of column D for Part B = ________. = Average FVI for Sediment Trapping.

EVALUATION AREA FOR FUNTIONAL VALUE 9 = Total area of wetland = __________ acres.

V.10 FUNCTIONAL VALUE 10 – NUTRIENT ATTENUATION

Nitrogen and phosphorous, the components of fertilizers used in agricultural fields and on lawns, are two plant nutrients most often associated with water pollution. Excessive amounts of these nutrients in lakes and slow moving streams can cause algal blooms and oxygen deficiencies which may result in fish kills and reduced water quality. In New Hampshire, excess nutrients are associated with human activity, such as urbanization and agriculture. Undeveloped watersheds generally export very low levels of nutrients to downstream lakes. The processes which occur in a lake as a result of excess nutrients are lumped together under the term eutrophication.

Within reason, a wetland can attenuate (reduce or lessen the impact of) nutrient levels in a downstream lake so that the effects of eutrophication are prevented or reduced. Wetlands usually serve as buffers between upland areas and waterbodies, and are thereby able to intercept and absorb excess nutrients transported in runoff waters. Some of the nitrogen is released to the atmosphere as a harmless gas, while much of the excess nitrogen and phosphorous is stored in sediments or taken up by wetland plants.

Rooted emergents in a wetland bordering a lake compete with algae (phytoplankton) for phosphorus in the lake. In the absence of these emergents, excess phosphorus input from the watershed might cause algal blooms in the lake and a consequent reduction in water quality. Attenuation can also occur as the result of changes in the seasonal timing of nutrient releases from the wetland, so that nutrients are held back during the growing season and released during the winter when the changes for algal blooms is low.

In some instances, the nutrient loads in a watershed are so high that the wetland itself can be overwhelmed to the point that excess nutrients are simply passed on downstream without significant attenuation. The application of sound conservation practices in the watershed can significantly reduce excess nutrient loading to wetlands and downstream water bodies.

This evaluation looks at the potential for a wetland to attenuate nutrient impacts on downstream waterbodies. It is divided into two parts. Part A evaluates the opportunity for the wetland to attenuate nutrients given the current land use in the watershed above the wetland. Part B evaluates the overall potential for nutrient attenuation by the wetland (considering both opportunity and the wetland's potential to retain or otherwise attenuate nutrients). The average FVI from Part A is used in Part B to calculate the overall average FVI for Nutrient Attenuation of the wetland.

PART A: OPPORTUNITY FOR NUTRIENT ATTENUATION

ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:

V.10.1A (Part A) Question 1 – *Opportunity for sediment trapping.*

Directions **-** Record the Average FVI from Part A of Functional Value 9.

Rationale – Some nutrients, such as phosphorus are closely associated with sediment particles. Erosion of sediment particles, especially from fertilized land such as cropland will result in an increase in the nutrients washed downstream.

V.10.2A (Part A) Question 2 – *Potential sources of excess nutrients in the watershed above wetland.*

Directions **-** Determine if there are potential sources of excess nutrients into the watershed. Such sources include active croplands, pastureland, dairies and other livestock operations, sewage treatment plants and on-site septic systems within 100 feet of the stream. Answer the question in terms of the watershed size. For example, two dairy farms in a watershed of 2000 acres would be considered to be many dairy farms since the watershed is relatively small. On the other hand, two dairy farms in a watershed of 50,000 acres would be considered relatively few.

Rationale – The above is a list of activities which may release excessive amounts of nutrients into the aquatic ecosystem.

PART B: OVERALL POTENTIAL FOR NUTRIENT ATTENUATION

QUESTIONS TO ANSWER IN THE OFFICE:

V.10.1B (Part B) Question 1 – *Opportunity for nutrient attenuation.*

Directions **-** Record the Average FVI from Part A of this Functional Value.

Rationale – To have the highest value to Nutrient Attenuation, a wetland must have both a high trap efficiency for nutrients and an opportunity for attenuate nutrients

V.10.2B (Part B) Question 2 – *Overall potential for sediment trapping in the wetland.*

Directions **-** Record the Average FVI from Part B of Functional Value 9.

Rationale – Because certain nutrients, notably phosphorus, are associated with sediment particles, wetlands which trap sediments will also trap these nutrients.

QUESTIONS TO ANSWER IN THE FIELD:

V.10.3B (Part B) Question 3 – *Dominant wetland class.*

Directions **-** As for Question V.2.4, but the evaluation criteria in Column C are different.

Rationale – Floating aquatic vegetation and emergents compete directly with algae for nutrients and may therefore have more direct impact on algae populations. Bogs generally represent nutrient poor systems. The presence of a bog indicates that the input of nutrients to the wetland is relatively low. Bogs are more common as you go north or higher in elevation. Some bogs, such as kettle holes, have very small watersheds and do not have a surface outlet.

V.10.4B (Part B) Question 4 – *Wetland hydroperiod.*

Directions **-** The wetland hydroperiod is the time period during which surface water remains on the wetland. Determine if there is permanent standing water in the wetland. This has been done for Question V.9.5B. In addition, determine if the wetland is flooded or ponded during a portion of the growing season. This may be difficult to do by the indicators that a particular wetland floods or ponds include the presence of marsh plants, such as cattails, and the location of the wetland is a distinct topographic depression or adjacent to a river that is known to flood annually.

Rationale –Flooded or ponded water in a wetland creates conditions that are conducive to the retention of nutrients in the sediment as well as the release of nitrogen as a harmless gas.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 10

NUTRIENT ATTENUATION

- USGS topographic map
- Land use map or recent aerial photographs
- Knowledge or familiarity with the area regarding extent and type of current development
- Ability to delineate a watershed (See Appendix E)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A –Opportunity for Nutrient Attenuation			
ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:			
1 Opportunity for sediment trapping.		Average FVI for Part A of FV9	________
2 Potential sources of excess nutrients in watershed above wetland.		a. Large areas of active cropland, pastureland, or urban land. Many dairies or other livestock operations, sewage treatment plants, or numerous on-site septic systems within 100 feet of stream	1.0
		b. Watershed contains some areas of active croplands, pastureland, or urban land. A few dairies or other livestock operations or a few on-site septic systems within 100 feet of the stream	0.5
		c. Watershed predominantly forested or otherwise undeveloped	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 10, PART A = Average of column D for Part A = _____________.

PART B – Overall Potential for Nutrient Attenuation			
QUESTIONS TO ANSWER IN THE OFFICE:			
1 Opportunity for nutrient attenuation.		Average FVI from Part A (above)	________
2 Overall potential for sediment trapping in the wetland.		Average FVI for Part B of FV9	________
QUESTIONS TO ANSWER IN THE FIELD:			
3 Dominant wetland class. (Refer to Question V.2.4).		a. Floating aquatic plants, emergent (marsh), forested, or scrub/shrub, except bogs	1.0
		b. Bogs	0.1

Wetland Name/Code:________________________________

Functional Value 10
NUTRIENT ATTENUATION
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Function al Value Index (FVI)
4 Wetland hydroperiod.		a. Wetland contains permanently impounded open water >5 acres in size	1.0
		b. Wetland contains permanently impounded open water from 0.5 to 5 acres in size, **OR** more than 5 acres of the wetland are flooded or ponded annually during a portion of the growing season.	0.5
		c. Above criteria are not met (e.g. the wetland has predominantly saturated soil conditions and is rarely ponded or flooded during the growing season)	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 10, PART B = Average of column D for Part B = ________. = Average FVI for Nutrient Attenuation.

EVALUATION AREA FOR FUNTIONAL VALUE 10 = Total area of wetland = __________ acres.

V.11 FUNCTIONAL VALUE 11 – SHORELINE ANCHORING AND DISSIPATION OF EROSIVE FORCES

Shoreline anchoring is an important function of wetlands. Wetlands often act as a buffer zone between watercourses (and their inherent wave action) and upland. This buffering reduces shoreline erosion and the accompanying sediment deposition within the watercourses. Where there is a bank of upland between the waterbody and the adjacent wetland area, it is unlikely that the wetland would play a role in shoreline anchoring. If there is no watercourse, lake or pond within or adjacent to the wetland, leave this Functional Value out of the assessment.

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.11.1 Question 1 – *Wetland morphology.*

Directions **-** Determine if there is a distinct shoreline or bank between the watercourse and wetland or upland.

Rationale – Those wetlands which grade from open water to upland or wooded wetland without a distinct shoreline are well protected from erosive forces.

V.11.2 Question 2 – *Width of wetland bordering watercourse, lake or pond.*

Directions **-** Determine the average width of wetland bordering watercourse.

Rationale – The N.H. Method assumes that wider wetlands are more resistant to erosive forces than narrower wetlands.

V.11.3 Question 3 – *Vegetation density of wetland bordering watercourse, lake or pond.*

Directions **-** Make a visual estimate of vegetation density. This is best done during the summer because some aquatic species die back during the winter.

Rationale – A high vegetation density is required to anchor soil. Sparsely vegetated or bare areas are very susceptible to erosion.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

- USGS topographic map
- Recent aerial photograph
- Ruler or scale

Functional Value 11

SHORELINE ANCHORING AND DISSIPATION OF EROSIVE FORCES

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1 Wetland morphology.		a. No distinct shoreline or bank evident between waterbody and wetland or upland. Wetland grades from aquatic bed and/or marsh (emergent vegetation) landward to shrub swamp or wooded swamp	1.0
		b. Distinct shoreline or bank evident between waterbody and wetland or upland. Shoreline or bank presently showing minimal signs of erosion	0.5
		c. Distinct shoreline or bank evident between waterbody and wetland or upland. Shoreline or bank presently showing signs of severe erosion	0.1
2 Width of wetland bordering watercourse, lake or pond.		a. More than 10 feet	1.0
		b. From 3 to 10 feet	0.5
		c. Less than 3 feet	0.1
3 Vegetation density (shrubs or emergents) of wetland bordering watercourse, lake or pond.		a. High: More than 90 percent ground cover	1.0
		b. Moderate: From 70-90 percent ground cover	0.5
		c. Low: Less than 70 percent ground cover	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 11 = Average of column D = _____________.

EVALUATION AREA FOR FUNTIONAL VALUE 11 = $\frac{\text{L x 10 feet}}{\text{43,560 sq.ft./acres}}$ = _______________ acres.

Where: L = Length of shoreline (stream, lake or pond) within wetland in feet.
(Shoreline of stream = length of stream x 2 (number of banks)).

10 feet = The minimum width of the wetland assumed to be actually anchoring the shore
43,560 sq. ft. = one acre

V.12 FUNCTIONAL VALUE 12 – URBAN QUALITY OF LIFE

Wetlands have the potential to enhance the quality of human life in an urban environment. Historically, many wetlands in urbanized areas were left undeveloped because of severe site limitations. As a result, those wetlands remaining in urban areas may be among the last refuges for wildlife as well as some of the few remaining "natural" viewscapes. This Functional Value is an attempt to recognize the importance of wetlands in an urban environment.

Because of the impacts of intense human activity, urban wetlands may not perform certain functions as well as wetlands in undeveloped areas. For this reason they tend to rank lower in the N.H. Method for several values including Ecological Integrity, Wetland Wildlife Habitat, and Visual/Aesthetic Quality. This should not be interpreted to mean that urban wetlands have no value for these functions. These wetlands may have considerable value when considered in the context of the surrounding urban land.

In a sense, the importance of an urban wetland is increased by its surroundings. For example, the wetland itself may provide only marginal wildlife habitat, but because it is surrounded by urban land, which may have little or no habitat for wildlife, the wetland takes on a significance that it would not otherwise have.

Wetlands in an urban environment are often marred by dumping of trash and litter. However, when evaluating an urban wetland, take into account how easily the visual detractors can be removed. A somewhat degraded wetland could be the target of a neighborhood clean-up campaign, for instance.

NOTE: This Functional Value draws those questions which apply to wetlands in an urban setting from some of the preceding Functional Values. While the directions for these questions remain the same, some of the evaluation criteria (Column C) will be different.

Do not complete parts B through E unless it is established that the wetland is in an urban setting. The criteria for this is an Average FVI of at least 0.5 for Part A of this Functional Value or other evidence that the wetland is in an urban setting.

PART A: PRESENCE OF AN URBAN SETTING

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.12.1A (Part A) Question 1 – *Dominant land use within 0.5 miles of wetland.*

Directions **-** Determine the dominant land use within 0.5 miles of the wetland during the site visit or from aerial photographs. The dominant land use is defined in this question as the land use(s) which occupies over 50% or more of the area within 0.5 miles of the wetland.

Rationale – The N.H. Method assumes that areas which are at least 50% dedicated to commercial/industrial/transportation use or high density residential use are by definition urban. It is in these areas that wetlands take on additional importance as a last refuge for "natural values" such as the Wetland Wildlife Habitat Functional Value.

V.12.2A (Part A) Question 2 – *Rate of development within 0.5 miles of wetland.*

Directions **-** Determine the rate of development within 0.5 miles of the wetland. Is it rapidly developing, already developed or unlikely to be developed?

Rationale – The rate of development gives some indication of the future land use in the area around the wetland. Wetlands gain additional value for urban quality of life in areas that are rapidly developing and urban character.

PART B: WETLAND WILDLIFE HABITAT IN AN URBAN SETTING

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.12.1B (Part B) Question 1 – ***Area of shallow permanent open water (less than 6.6 feet deep) including streams.***

Directions **-** As for Question V.2.2, Functional Value 2, but the evaluation criteria in Column C are different.

Rationale – As for Question V.2.2.

V.12.2B (Part B) Question 2 – ***Wetland diversity.***

Directions **-** As for Question V.2.4, Functional Value 2, but the evaluation criteria in Column C are different.

Rationale – As for Question V.2.4.

V.12.3B (Part B) Question 3 – ***Dominant wetland class.***

Directions **-** Record the FVI from Question V.2.5, Functional Value 2.

Rationale – As for Question V.2.5.

V.12.4B (Part B) Question 4 – ***Interspersion of vegetation and/or open water.***

Directions **-** Record the FVI from Question V.2.6, Functional Value 2.

Rationale – As for Question V.2.6.

V.12.5B (Part B) Question 5 – ***Stream corridor vegetation (within 15 feet on each side of stream).***

Directions **-** Determine the percent of the stream corridor (within 1000 feet up and down stream of the wetland) which is in shrubs, trees and unmowed herbaceous vegetation. Count only areas that provide a dense border of shrubs, trees and unmowed herbaceous vegetation at least 15 feet wide along the stream. Include yards if there is a border of shrubs and trees at least 15 feet wide along the stream (Figure V.12.1). Do not include areas that are mowed or paved right up to the stream. Do not count areas where trees are planted in mowed lawns or where the shrub and/or herbaceous layer of vegetation is not present.

Rationale – Well-vegetated stream corridors are particularly important in urban areas because of their beneficial effect on water quality as well as their value for wildlife.

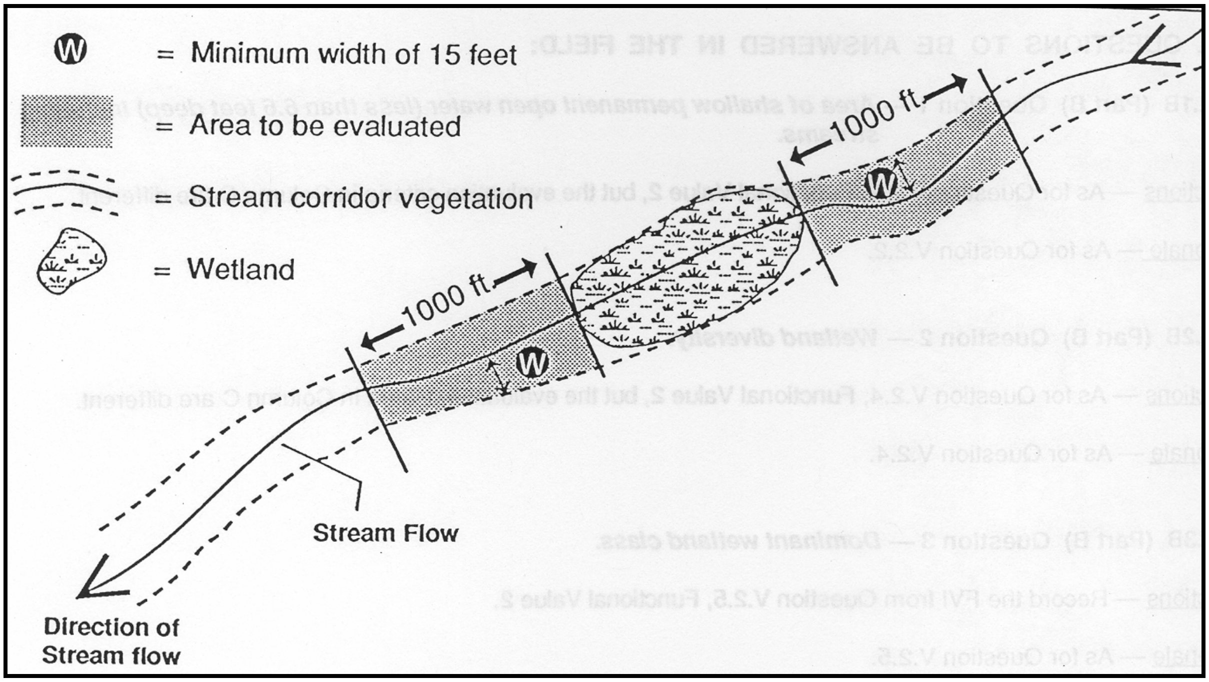


Figure V.12.1 Stream corridor vegetation within 15 feet of stream

PART C: EDUCATIONAL OPPORTUNITY IN AN URBAN SETTING

Although an urban wetland may not be suitable as an outdoor classroom *per se*, it may be valuable as a site for a field trip to examine the impacts of human activity on a wetland.

QUESTION TO ANSWER IN THE OFFICE:

V.12.1C (Part C) Question 1 – *Proximity of potential educational site to schools.*

Directions **-** Record the FVI from Question V.4.3, Functional Value 4.

Rationale – As for Question V.4.3.

QUESTIONS TO ANSWER IN THE FIELD:

V.12.2C (Part C) Question 2 – *Off-road parking at potential educational site suitable for school buses.*

Directions **-** Record the FVI from Question V.4.6, Functional Value 4.

Rationale – As for Question V.4.6.

V.12.3C (Part C) Question 3 – *Student Safety.*

Directions **-** Record the FVI from Question V.4.10, Functional Value 4.

Rationale – As for Question V.4.10.

V.12.4C (Part C) Question 4 – ***Access to perennial stream or lake at potential educational site.***

Directions **-** As for Questions V.4.8 and V.4.9, Functional Value 4.

Rationale – As for Questions V.4.8 and V.4.9.

PART D: VISUAL/AESTHETIC QUALITY IN AN URBAN SETTING

While wetlands in an urban setting may not have the visual/aesthetic appeal of wetlands in a less disturbed setting, they can provide a pleasing visual contrast to the surrounding urban landscape.

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.12.1D (Part D) Question 1 – ***Number of wetland classes visible from primary viewing location(s).***

Directions **-** As for Question V.5.1, Functional Value 5, but the evaluation criteria in Column C are different.

Rationale – As for Question V.5.1.

V.12.2D (Part D) Question 2 – ***Dominant wetland class visible from primary viewing location(s).***

Directions **-** Record the FVI from Question V.5.2, Functional Value 5.

Rationale – As for Question V.5.2.

V.12.3D (Part D) Question 3 – ***Approximate extent of open water visible from primary viewing location(s).***

Directions **-** As for Question V.5.5, Functional Value 5, but the evaluation criteria in Column C are different.

Rationale – As for Question V.5.5.

V.12.4D (Part D) Question 4 – ***Area of wetland dominated by flowering trees or shrubs, or trees or shrubs which turn vibrant colors in the fall.***

Directions **-** As for Question V.5.9, Functional Value 5, but the evaluation criteria in Column C are different.

Rationale – As for Question V.5.9.

V.12.5D (Part D) Question 5 – ***General appearance of the wetland visible from primary viewing location(s).***

Directions **-** Judge the visual quality of the wetland based on the criteria provided.

Rationale – The aesthetic quality of wetlands lies in the natural beauty of their lush vegetation. Trash and other signs of disturbance detract from this beauty. In an urban setting, however, there will probably be some trash and litter present. Remember, you are looking for a viewscape that provides some relief from the surrounding urban landscape. Therefore, the criteria by which a wetland is judged for its visual/aesthetic beauty should not be as strict as in a more pristine setting. Also, take into account the ease with which visual detractors could be removed from a wetland. For instance, a somewhat degraded wetland might be the focus of a neighborhood cleanup campaign.

PART E: WATER-BASED RECREATION IN STREAM OR LAKE ASSOCIATED WITH A WETLAND IN AN URBAN SETTING

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.12.1E (Part E) Question 1 – *Water quality of the watercourse, pond or lake associated with the wetland.*

Directions **-** Record the FVI for Question V.1.3, Functional Value 1.

Rationale – As for Question V.1.3.

V.12.2E (Part E) Question 2 – *Opportunities for wildlife observation.*

Directions **-** Record the Average FVI from Part B of this Functional Value.

Rationale – Vistas that include wetland wildlife enhance the aesthetic quality of a wetland.

V.12.3E (Part E) Question 3 – *Hazard(s) which may limit public use.*

Directions **-** Determine whether there are hazards, such as toxic dumps, railroad trestles, etc. in the wetland which might be dangerous to the public.

Rationale – Safety hazards are an obvious drawback to recreational use by the public.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

- USGS topographic map
- Land use map or recent aerial photographs
- Town zoning map
- N.H. Water Quality Report to Congress 305(b)

Functional Value 12

URBAN QUALITY OF LIFE

NOTE: Do not complete parts B through E unless it is established that the wetland is in an urban setting. The criteria for this is an FVI of at least 0.5 for Part A of this Functional Value or other evidence that the wetland is in an urban setting.

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A –Presence of an Urban Setting			
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1 Dominant land used within 0.5 miles of wetland.		a. Commercial/industrial/ transportation use or high density residential (quarter acre lots) use	1.0
		b. Rural residential use (2 acre lots)	0.5
		c. Agriculture, forestry or similar open space zoning	0.1
2 Rate of development within 0.5 miles of wetland.		a. Area rapidly developing or already predominantly developed for above uses	1.0
		b. Moderate development presently occurring	0.5
		c. Very little development likely to occur in the foreseeable future.	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 12, PART A = Average of column D for Part A = _____________.

PART B – Wetland Wildlife Habitat in an Urban Setting			
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1 Area of shallow permanent open water (less than 6.6 feet deep) including streams. (Refer to Question V.2.2).		a. 0.5 acres or more	1.0
		b. Less than 0.5 acres	0.1
2 Wetland diversity. (Refer to Question V.2.4).		a. Two or more wetland classes present	1.0
		b. One wetland class present	0.1
3 Dominant wetland class.		FVI from Question V.2.5	________
4 Interspersion of vegetation and/or open water.		FVI from Question V.2.6	________

Wetland Name/Code:________________________________

Functional Value 12
URBAN QUALITY OF LIFE
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART B – Continued			
5 Stream corridor vegetation (within 15 feet on each side of stream)		a. Wetland borders a stream and >75% of the stream corridor is in shrubs, trees, and herbaceous vegetation for a distance of 1000 feet upstream and downstream of wetland	1.0
		b. Wetland borders a stream and between 25% and 75% of the stream corridor is in shrubs, trees, and herbaceous vegetation for a distance of 1000 feet upstream and downstream of wetland	0.5
		c. Less than 25% of the stream corridor is in shrubs, trees, and herbaceous vegetation for a distance of 1000 feet upstream and downstream of wetland, **OR** wetland not bordering a stream	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 12, PART B = Average of column D for Part B = _____________.

EVALUATION AREA FOR PART B FUNCTIONAL VALUE 12 = Total area of wetland = __________ acres.

PART C – Educational Opportunity in an Urban Setting

QUESTION TO ANSWER IN THE FIELD:

1 Proximity of potential educational site to schools.		FVI from Question V.4.3	_______

QUESTION TO ANSWER IN THE OFFICE:

2 Off-road parking at potential educational site suitable for school buses.		FVI from Question V.4.6	_______
3 Student safety.		FVI from Question V.4.10	_______

Wetland Name/Code:________________________________

Functional Value 12
URBAN QUALITY OF LIFE
(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART C – Continued			
4 Access to perennial stream or lake at potential educational site (Refer to Questions V.4.8 and V.4.9)		a. Direct access available	1.0
		b. Water access not available but feasible to develop	0.5
		c. Perennial stream or lake not present or access not feasible to develop	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 12, PART C = Average of column D for Part C = _____________.

EVALUATION AREA FOR PART C FUNCTIONAL VALUE 12 = Area of potential educational site = __________ acres.

PART D – Visual/Aesthetic Quality in an Urban Setting

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

1 Number of wetland classes visible from primary viewing location(s). (Refer to Question V.5.1).		a. Two or more classes	1.0
		b. One class	0.1
2 Dominant wetland class visible from primary viewing location(s).		FVI from Question V.5.2	_______
3 Approximate extent of open water visible from primary viewing location(s). (Refer to Question V.5.5)		a. More than 0.5 acres or 200 feet of stream	1.0
		b. Less than 0.5 acre or 200 feet of stream	0.1
4 Area of wetland dominated by flowering trees or shrubs, **OR** trees or shrubs which turn vibrant colors in the fall. (Refer to Question V.5.9).		a. More than 1 acre	1.0
		b. Less than 1 acre	0.1

Wetland Name/Code:________________________________

Functional Value 12

URBAN QUALITY OF LIFE

(continued)

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART D – Continued			
5 General appearance of the wetland visible from primary viewing location(s).		a. No major detractors (such as litter) or detractors could be removed	1.0
		b. Some detractors present which could not easily be removed	0.5
		c. Major detractors which could not easily be removed	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 12, PART D = Average of column D for Part D = _____________.

EVALUATION AREA FOR PART D FUNCTIONAL VALUE 12 = Total area visible from primary viewing location(s) = __________ acres.

PART E – Water-based Recreation in Stream or Lake Associated with a Wetland in an Urban Setting

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

A	B	C	D
1 Water quality of the watercourse, pond or lake associated with the wetland.		FVI from Questions V.1.3	_______
2 Opportunities for wildlife observation.		Average FVI for Part B of this Functional Value	_______
3 Hazard(s) which may limit public use.		a. No major hazards present such as railroad trestles, cellar holes, etc., **OR** hazards easily corrected	1.0
		b. Existing hazards moderately difficult to correct	0.5
		c. Major hazards which would be difficult and/or expensive to correct	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 12, PART E = Average of column D for Part E = ________.

EVALUATION AREA FOR PART E, FUNTIONAL VALUE 12 = Area of wetland evaluated for water-based recreation = __________ acres.

V.13 FUNCTIONAL VALUE 13 –HISTORIAL SITE POTENTIAL

An applreciation for the past is one of our most distinctly human characteristics. As we investigate wetlands in order to understand their value to us we should be aware of the value they may have had to those who lived here before us. Early settlers made extensive use of wetlands and streams and lakes associated with them.

Like us today, the early settlers had a need for water which they found in ample supply in and around wetlands. Water power was harnessed to provide power for milling flour, sawing timber, and eventually for manufacturing.

As you evaluate the wetland and surrounding area in question, look for indications of historic use. Features to look for as historic sites include structures and foundations, walls, dams, sluiceways, or dumps. Close examination of a wetland and its immediate margins may yield some surprises from a time gone by.

NOTE: If the study site has known or documented archaeological significance, refer to question V.14.6 in Functional Value 14.

The Average FVI for the Functional Value = 1.0 if the site has known/documented Historical Significance.

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

V.13.1 Question 1 – *Proximity of potential site to nearest perennial watercourse.*

Directions **-** Pace off or measure with tape the distance from the nearest year-round watercourse to the potential industrial or commercial site. Investigate historic maps and records to see if a given stream that is now intermittent may once have flowed year-round, and locate such historic features as saw or grist mills, woodworking shops, or brickyards.

Rationale – Industry of yesteryear got its power from moving water. A year-round stream had the potential of serving many such facilities. Brickyards operated near natural clay sources which were found near former lake beds, rivers or streams.

V.13.2 Question 2 – *Visible stone or earthen foundations, berms, dams, standing structures or associated features..*

Directions **-** Establish by field investigation whether an historic feature (such as those listed above) is present.

Rationale – The indication of features, structures, or foundations in the field or through archival sources reflects possible past industrial or commercial use. Further information on such sites may be available from town historic societies, town histories, or the State Archaeologist's office.

V.13.3 Question 3 – *Existence of mill pond at the site.*

Directions **-** Determine if there is, or might have been, a mill pond at the site. While the pond may have been drained since its last use, there may be indications of its existence on the landscape as a marshy area or depression. If either of these exist, in combination with what might have been a dam at the pond's lower end, the chance of a valuable historic site is enhanced.

Rationale – The greatest number of mills would have had some source of stored power to turn the wheel on demand. Typically, a pond would have stored the water necessary for that power.

V.13.4 Question 4 – *Presence of historical buildings.*

Directions **-** Note the presence of noteworthy historical buildings (e.g. homesteads, commercial buildings, etc.) in the vicinity of the wetland. This information can be checked with the town historical society or by consulting the town history if available.

Rationale – The presence of historical buildings can increase the overall noteworthiness of the wetland as an historic site.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

- USGS topographic map
- Recent aerial photographs
- Research of town historical map(s)/town history
- National Register of Historical Places
- Local knowledge of historical sites

Functional Value 13

HISTORICAL SITE POTENTIAL

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1 Proximity of potential site to nearest perennial watercourse.		a. 0-50 yards	1.0
		b. 51-100 years	0.5
		c. > 100 yards	0.1
2 Visible stone or earthen foundation, berms, dams, standing structures, etc.		a. Yes	1.0
		b. No	0.0
3 Existence of mill pond at site.		a. Presence of pond or pond site **AND** remains of dam	1.0
		b. Presence of pond or pond site **OR** remains of dam	0.5
		c. No apparent remains of pond or of dam	0.1
4 Presence of historical buildings		a. Yes	1.0
		b. No	0.0

AVERAGE FVI FOR FUNCTIONAL VALUE 13 = Average of column D= _____________.

AVERAGE FVI FOR FUNCTIONAL VALUE 13 = 1.0 if the site has known or documented historical significance.

EVALUATION AREA FOR FUNTIONAL VALUE 13 = Area of potential site for historical significance = _______ acres.

V.14 FUNCTIONAL VALUE 14 –NOTEWORTHINESS

Noteworthiness refers to certain features a wetland may possess which gives it a high value regardless of any other attribute.

ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:

V.14.1 Question 1 – ***Wetland contains critical habitat for a state or federally listed threatened or endangered species.***

Directions **-** Information on the critical habitats for threatened and endangered species can be obtained from N.H. Natural Heritage Inventory, the U.S. Fish and Wildlife Service, and N.H. Fish and Game Department's Non-game Program.

Rationale – Critical habitats for threatened or endangered species are those areas believed to be necessary for the survival of that species..

V.14.2 Question 2 – ***Wetland is known to be a study site for scientific research.***

Directions **-** There is no simply way of determining this. Inquiries at local colleges and universities may be helpful. Sometimes, however, researchers may come from out-of-state. The Investigator must use some judgment to decide how far to pursue this question.

Rationale – It is important that areas of scientific study be left undisturbed. Some studies may require data collection over many years.

V.14.3 Question 3 – ***Wetland is a national natural landmark or recognized by the NH Natural Heritage Inventory as an exemplary natural community in N.H.***

Directions **-** Determine if the wetland is included on such a list. One source of these lists is the New Hampshire Natural Heritage Inventory, or the National Register of Historic Places.

Rationale – Designated natural landmarks are unique or outstanding examples of ecological or geographical features.

V.14.4 Question 4 – ***Wetland has local significance because it ranks among the highest number of Wetland Value Units (WVU) within the study area for one or more Functional Values.***

Directions **-** After all the wetlands within the evaluation area have been evaluated, determine the wetlands which have the highest WVU's for each of the first 13 Functional Values in the N.H. Method. This top scoring wetlands for each of the Functional Values should be given a score of 1.0 for this question. The cutoff score for inclusion in this group should be documented. A recommended level would be the top 5% of wetland in each Functional Value.

Rationale – Wetlands can be significant within a local geographical or political area even though they may rate only average or less when compared to other wetlands when a larger geographic area is considered. The N.H. Method assumes that a wetland has local significance if one of more of its Functional Values is among the highest WVU's of all wetlands in the study area.

V.14.5 Question 5 – *Wetland has local significance because it has biological, geological, or other features which are locally rare or unique.*

Directions **-** This question is somewhat open ended and may not be completely answerable within the time frame allowed for the evaluation. It is important, however, to look at such things as wetland size. For example, a certain wetland may be the largest wetland of its class in the study area. This could be determined by studying U.S. Geological Survey (USGS) topographic maps or the National Wetlands Inventory (NWI) maps published by the U.S. Fish and Wildlife Service. The wetland may also be home to species of special concern, or it may be the last (or one of the last) wetlands in a highly urban area.

Rationale – Some wetlands may have locally rare or unique attributes which may not otherwise be recognized by the N.H. Method, for example, vernal pools.

V.14.6 Question 6 – *Wetland is known to contain an important archaeological site.*

Directions **-** Consult town historic resources or inquire through the state archaeological office to determine known or documented evidence of an archaeological site. **Note:** It is recommended that the specific location of archaeological sites should be kept confidential to reduce the possibility of vandalism.

Rationale – Certain wetlands may contain or be adjacent to important archaeological sites such as Indian encampments, on level well drained terraces near water sources. Native Americans frequently lived on the margins of wetland, and used resources provided by the wetland itself.

V.14.7 Question 7 – *Wetland is hydrologically connected to a state of federally designated river.*

Directions **-** Determine whether the wetland is hydrologically connected to a river designated under the New Hampshire Rivers Management and Protection Program Act (1988) or the National Wild and Scenic Rivers Act (1968). Information about the former can be obtained from N.H. Department of Environmental Services, and about the latter from the U.S. National Park Service.

Rationale – River resources may be protected under the state and federal programs listed above. Such rivers must meet the criteria possessing at least one outstanding value, such as scenic value, recreational, geological, fish and wildlife, historical, etc. Wetlands that are hydrologically connected to such rivers form an important component of the ecology of that river system.

Wetland Name/Code:________________________________

NEEDED FOR THIS EVALUATION

Functional Value 14

NOTEWORTHINESS

- List of federal and/or state endangered or threatened species
- Knowledge of any management activities by local nature centers, land protection groups, scouting programs, garden clubs, etc.
- Completed evaluations for all other wetlands in the study area

A Evaluation Questions	B Computations Or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:			
1 Wetland contains critical habitat for a state or federally listed threatened or endangered species.		a. Yes b. No	1.0 0.0
2 Wetland is known to be a study site for scientific research.		a. Yes b. No	1.0 0.0
3 Wetland is a national natural landmark or recognized by NHNHI as an exemplary natural community.		a. Yes b. No	1.0 0.0
4 Wetland has local significance because it ranks among the highest number of WVU's within the study area for one or more Functional Values.		a. Yes b. No	1.0 0.0
5 Wetland has local significance because it has biological, geological, or other features which are locally rare or unique.		a. Yes b. No	1.0 0.0
6 Wetland is known to contain an important archaeological site.		a. Yes b. No	1.0 0.0
7 Wetland is hydrologically connected to a state or federally designated river.		a. Yes b. No	1.0 0.0

AVERAGE FVI FOR FUNCTIONAL VALUE 14 = 1.0 if the FVI for any question is equal to 1.0, otherwise the average FVI for Functional Value 14 is 0.0 = _______.

EVALUATION AREA FOR FUNTIONAL VALUE 14 = Total area of wetland = _______ acres.

SECTION VI

GLOSSARY

VI. GLOSSARY

This glossary provides non-technical definitions of some of the technical terms that are used in this manual. This is by no means an exhaustive list of all the terminology pertaining to wetlands. For more detailed reference to wetland terminology, the user is referred to the reference listed in Section VII of this manual.

Anadromous fish	Saltwater fish that enter freshwater to spawn.
Aquatic Bed	A wetland class dominated by plants that are completely submerged or float on the water surface (refer to Appendix C).
Aquifer	A geological formation, such as fractured bedrock, glacial sands or gravels, which contains water and will allow water to pass through it in sufficient quantities to be economically viable. This water is known as ground water.
Bog	Wetlands characterized by a waterlogged, spongy mat of sphagnum moss, ultimately producing a thickness of acid peat. Bogs are highly acid and tend to be nutrient poor. They are typically dominated by sedges, evergreen trees and shrubs.
Deep-water habitat	Aquatic habitats, such as lakes, rivers and oceans, where surface water is permanent and deeper than 6.6 feet most of the year (refer to Appendix C).
Ecology	The study of the interactions between living things and their environment.
Ecosystem	An organic community of plants and animals, viewed within its physical environment (habitat). The ecosystem results from the interaction between soil, climate, vegetation and animal life.
Emergents	Erect rooted herbaceous plants that can tolerate flooded soil conditions, but not extended periods of being completely submerged, e.g. cattails, reeds, pickerelweeds.
Emergent wetland	A wetland class dominated by emergent plants. Emergent wetlands include marshes, and wet meadows (refer to Appendix C)
Eutrophication	A high concentration of organic matter and mineral nutrients, such as phosphates and nitrates, can cause the over-fertilization of aquatic ecosystems. This results in excessively high levels of production and decomposition. Eutrophication can hasten the ageing process of a pond or lake due to the rapid buildup of organic remains.
Forested wetland	A wetland class where the soil is saturated and often inundated, and woody plants taller than 20 feet form the dominant cover, e.g. red maple, American elm, tamarack and black spruce. Water tolerant shrubs often form a second layer beneath the forest canopy, with a layer of herbaceous plants growing beneath the shrubs (refer to Appendix C).
Ground water	Water found at and beneath the water table in the zones of soil and bedrock which are saturated.
Ground water discharge	Ground water that emerges at the land surface, in the form of springs or seepage areas. Ground water can also discharge into rivers (via bank seepage) and sustain flow during the drier months.
Ground water recharge	The process whereby infiltrative rain, snowmelt or surface water enters and replenishes the ground water stores.
Habitat	The environment in which the requirements of a specific plant or animal are met.

Hydric soil	A soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic (oxygen lacking) conditions in the upper part of the soil. Hydric soils are generally poorly drained or very poorly drained. Poorly drained: Water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Very poorly drained: Water is removed from the soil so slowly that water remains at or on the surface during most of the growing season.
Intermittent stream	Streams which flow primarily during the wet seasons when the water table is high, and remain dry for a portion of the year. Most intermittent streams flow for a good portion of the year.
Marsh	An emergent wetland that is flooded either seasonally or permanently. Marshes support the growth of emergent plants such as cattails, bulrushes, reeds, sedges, floating-leaved plants such as pondweeds and submergents.
Open Water	A wetland class consisting of areas of water <6.6 feet deep. There are often submerged or floating-leaved plants in the shallower portions along the edges of the water body.
Palustrine	Palustrine wetlands include all fresh water wetlands dominated by trees, shrubs, emergents, mosses or lichens. It also includes wetlands lacking such vegetation, but with all of the following characteristics: 1) area<20 acres; 2) maximum water depth <6.6 feet; and 3) salinity <0.5% (refer to Appendix C)
Perennial stream	A stream that normally flows year-round in all years because it is sustained by ground water discharge as well as by surface runoff.
Scrub-shrub wetland	A wetland class dominated by shrubs and woody plants that are less than 20 feet tall, e.g. dogwoods, alders, red maple saplings, etc. Water levels in shrub swamps can range from permanent to intermittent flooding (refer to Appendix C)
Stratified drift	Layers of glacial sediments deposited by glacial meltwaters. Swifter waters deposited larger particles such as sand, and gravel, while slower moving waters deposited finer particles such as silt and clay.
Submergent	Plants that grown and reproduce while completely submerged by water, e.g. coontail and bladderworts.
Surface runoff	Water that flows over the surface of the land as a result of rainfall or snow-melt. Surface runoff enters streams and rivers to become channelized stream flow.
Swamp	A wetland where the soil is saturated and often inundated, and dominated by woody cover (shrubs) e.g. alder, or trees, e.g. red maple).
Wet meadow	Emergent wetlands that are generally seasonally flooded, and have saturated soils for much of the growing season. Wet meadows are dominated by grasses, sedges and rushes, and are very often cultivated or pastured.
Watershed	The area drained by a single river system.
Water table	The upper level of the portion of the ground (rock) in which all spaces are wholly saturated with water. The water table may be located at or near the land surface, or at a depth below the land surface and usually fluctuates from season to season. Where the water table intersects the land surface, springs, seepage, marshes or lakes may occur.

Section VII

REFERENCES

VII. LIST OF REFERENCES

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